

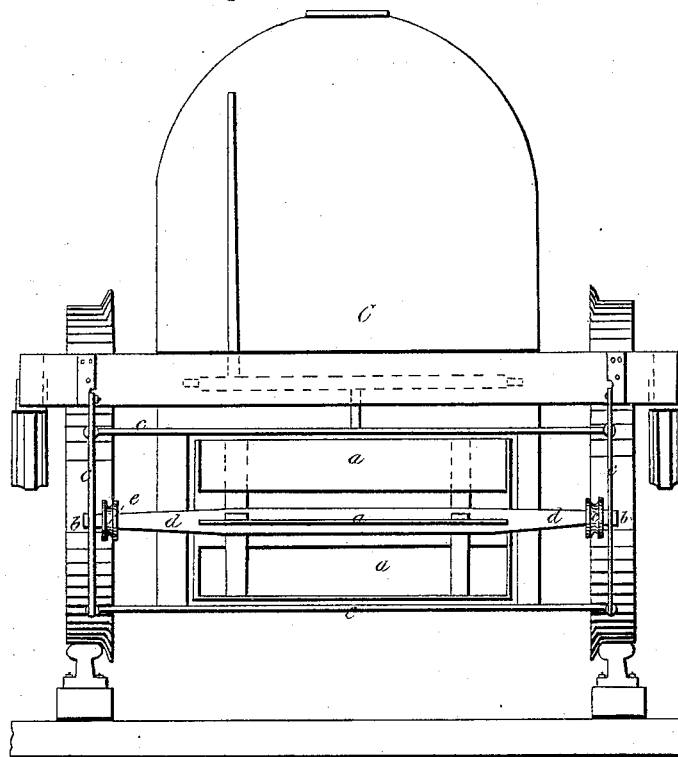
M. W. BALDWIN.

Locomotive.

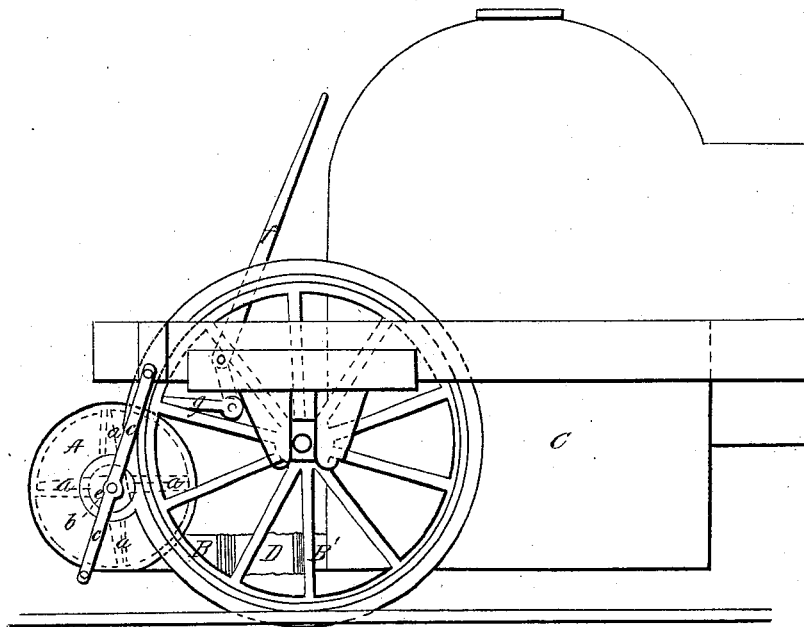
No. 1,921.

Patented Dec. 31, 1840.

*Fig. 2.*



*Fig. 1.*



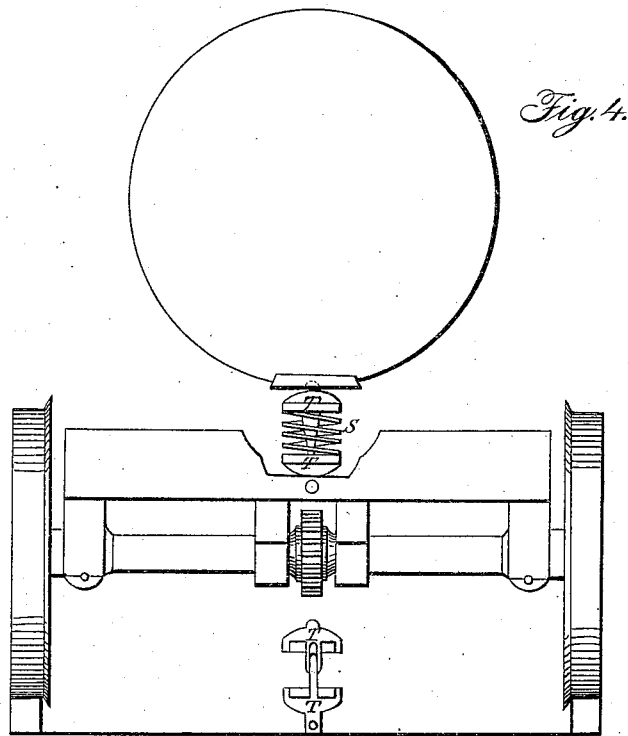
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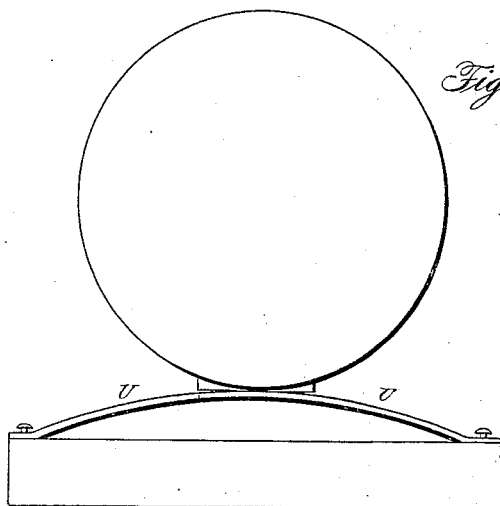
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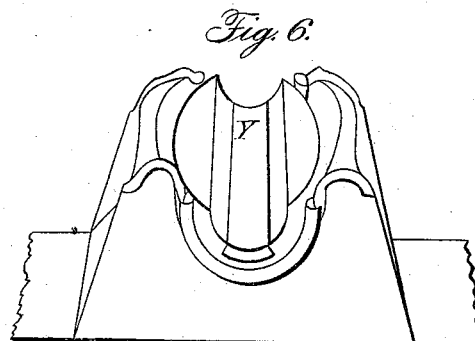
Patented Dec. 31, 1840.



*Fig. 4.*



*Fig. 5.*



*Fig. 6.*

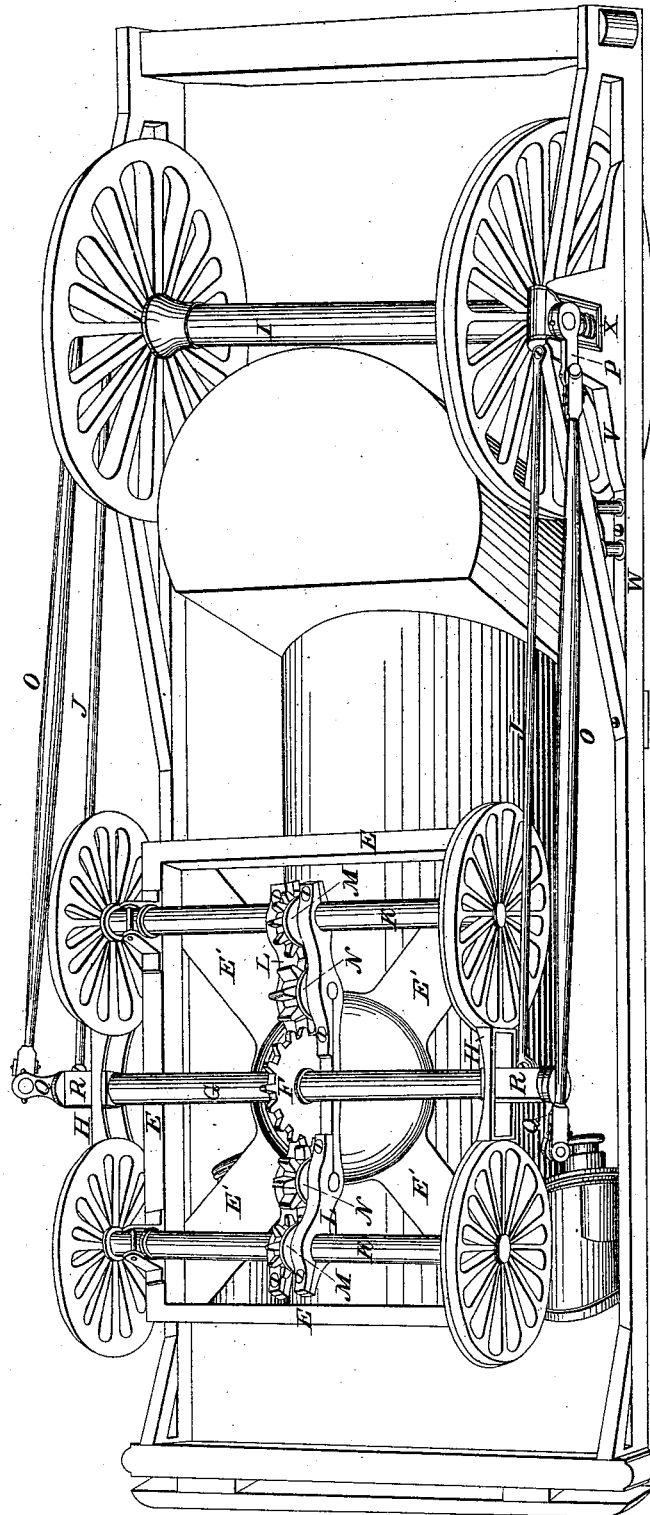
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Fig. 3.



# UNITED STATES PATENT OFFICE.

M. W. BALDWIN, OF PHILADELPHIA, PENNSYLVANIA.

## LOCOMOTIVE-ENGINE.

Specification of Letters Patent No. 1,921, dated December 31, 1840.

*To all whom it may concern:*

Be it known that I, MATTHIAS W. BALDWIN, of the city of Philadelphia, in the State of Pennsylvania, have made certain improvements in the Manner of Constructing Locomotive Steam-Engines; and I do hereby declare that the following is a full and exact description thereof.

My first improvement relates to the manner of operating a fan, or blowing wheel, for the purpose of blowing the fire, which fan, or blowing wheel, I cause to revolve by the friction of grooved pulleys which are made to embrace the flanches of the driving wheels of such engines, which, on my plan of making them will be behind the fire-box.

In the accompanying drawing, Figure 1, is a side view of a part of a locomotive engine, showing the fire-box, and such other parts as are requisite to exhibit the manner of fixing the blowing apparatus. A, is the drum within which the fan wheel revolves, the vanes of which are shown by the dotted lines *a, a*. The gudgeon on one end of the shaft of the fan is shown at *b*, having its bearing in a piece *c, c*, which constitutes a part of a frame within which the drum A, is embraced, and by which it is hung to the locomotive carriage. Fig. 2, is an end view of the locomotive, representing the same parts generally, as those shown in Fig. 1, and which are designated by the same letters of reference; but in this figure, the drum is not represented, being removed for the purpose of showing the vanes *a, a, a*, of the fan wheel, which are attached to the shaft *d, d*. Upon the projecting ends of this shaft, there are grooved pulleys *e, e*, the grooves of which embrace the flanches of the driving wheels, and are by this means made to give motion to the fan wheel. To enable these grooved wheels to adapt themselves to the inequalities in the motion of the driving wheels, I allow them to have a lateral motion on the shaft *d, d*, which may be effected by making the part of the shaft on which they are placed square, or by the use of a feather and groove, or other analogous device. The frame *c, c*, of the fan wheel, I suspend at its upper side to the frame of the locomotive, in such a manner that the pulleys *e, e*, shall bear upon the flanches of the driving wheels, against which they may be made to press not only by the gravity of the apparatus, but by means of a spring, or springs, or by a weight and pulley. A lever

*f*, attached to a joint piece *g*, is employed to enable the engineer to increase, or to diminish, the pressure of the pulleys upon the driving wheels, at pleasure. B, B', is an air tube leading from the drum A, into the ash-pit of the fire-box C; one part of this tube may be made to slide freely within the other, or there may be a flexible connecting piece D, covering the joint.

My next improvement consists in a new mode of arranging the gearing and general connection of the driving and truck wheels, in which arrangement the connecting axle is retained in its place, in part by being confined to the engine frame, and in part by the truck frame, in consequence of the particular manner in which I construct said frame. Fig. 3, in the accompanying drawings, which is a perspective view of the under side of my locomotive, represents this improved arrangement of the gearing, and of the respective parts connected therewith. E, E, E, is the truck frame, which is braced diagonally by the cross piece E', E', constituting a part of said frame; this piece is made dishing in the circular part at its center, to allow room for the gearing wheel F, which is made fast on the connecting axle G, G. The truck frame turns freely on a center pin projecting down from the under side of the boiler, in the usual manner, and is free to vibrate upon it in all directions. The ends of the connecting axle G, pass through the guide frames H, H, which frames are firmly attached to the truck frame, thus leaving the truck free to turn upon its center, and combining and connecting it with the said axle; this axle is thus allowed to vibrate vertically, while its parallelism to the axle I, of the driving wheels is preserved by means of the rods J, J, which are attached at one end to the connecting axle, and at the other to the main frame of the locomotive; these rods play sufficiently upon their points of attachment to allow the axle G, G, to vibrate vertically with the truck, as above stated. K, K, are the axles of the truck wheels, and L, L, is a gearing frame which embraces these axles, and also the toothed wheels M, M, which are attached to them. N, N, are intermediate wheels having their gudgeons in the frame L, L, and gearing into the wheels F, and M, M; the intermediate wheels N, N, are made of sufficient thickness to allow of the requisite lateral play of the truck, and, consequently, of the

wheels upon the axles K, K, and their own play on the wheel F. The connecting axle G, G, is made to revolve by means of the shackle bars O, O, which are actuated by cranks P, on the axis of the driving wheels, and are also connected to the cranks Q, Q, on the axle G, G. The ends of this axle pass through, and have their bearings in, the boxes R, R, upon which the guide frames H, H, vibrate. By this mode of gearing, in combination with the general arrangement of the parts herein described the connecting axle is at full liberty to vibrate vertically with the truck frame without altering, in any sensible degree, the relative distance of its connecting points with the main frame of the locomotive.

My next improvement consists in the so placing of the springs of the truck as to obviate the evil of the locking of the wheels when the truck frame vibrates from the center pin, vertically, to which they are liable when the springs are placed at the sides, in the usual manner. Instead of attaching them at the sides, I place them at each end of the truck frame, as shown in Figs. 4 and 5. In Fig. 4, S, is a spiral spring, the ends of which are received in two cups T, T, which cups are connected together at their centers by a pin upon one, and a socket on the other, within which socket said pin is received, as shown in the sectional drawing, so that the cups may approach toward, or recede from, each other, and still preserve their parallelism. These cups are made hemispherical at their outer ends, upon which there are pins which keep them in place; a rolling motion is thus allowed, by which the truck frame is free to vibrate from side to side, and, consequently, to adapt itself to the curvatures, or inequalities, of the road. In Fig. 5, I have shown a common elliptic, or bow, spring U, U, applied at the end of the truck, its middle part bearing against the bottom of the boiler, and its two ends resting on the end of the truck frame, where it is slotted to allow the necessary play endwise. To insure freedom of motion laterally, its bearing may be upon friction rollers; its effect will be similar to that of the first described spring; and it will be manifest that springs in other forms may be employed so as to produce a like result.

I have, also, improved the manner of constructing the iron frames of locomotives, by making the pedestals in one piece with, and constituting a part of, said frame. It has heretofore been the practice to give to the frame all the strength necessary, independently of the pedestals, which are attached thereto, in doing which a considerable increase of weight is required. In my frames, the pedestal V, and the slide bars W, Fig. 3, are in one solid piece, by means of which I attain great strength in the part

where it is most required, while the quantity of metal used is considerably diminished.

I have also invented and adopted a new manner of stuffing, or packing, by substituting metallic wire for hemp, cotton, or other fibrous materials, hitherto used for that purpose, by which means I insure a durability greatly transcending the ordinary stuffing, and find the action of this substance to possess all the properties desirable in stuffing, either around the stems of valves in stuffing boxes, or in other parts of the apparatus where stuffing is required.

I employ, in combination with the improved boxes for gudgeons, for which I obtained Letters Patent of the United States under date of the 24th day of August 1835, spiral springs for the driving wheels of locomotive engines, and for other wheels where my improved cylindrical boxes are used. One of these springs is shown as occupying the cylindrical recess of the pedestal at X, in Fig. 3.

For the information of those interested therein, I will here state that I have made an improvement in the manner of making, or preparing, the cylindrical recesses in the pedestals, for the reception of the cylindrical boxes. Instead of turning, or boring them out, I now make them by casting them on an iron core, and in order to prevent them from breaking by the contraction of the metal in cooling, I make the core in two pieces which are allowed to approach each other to an extent equal to the shrinkage of the metal. And in order to avoid the necessity of diminishing the ends of the spiral springs, to give them a proper bearing on the pedestal, I cast a spiral recess in the pedestal adapted to the reception of those ends. Having secured by Letters Patent, the manner of constructing such pedestals and boxes, I do not deem it necessary to make any claim to the improved process by which I now give to them the required form.

I likewise cast the boxes for the gudgeons in chills, by which great durability is given to them. I am aware that this has been done before, and I do not, therefore, make any claim thereto; but it has been found that there is considerable adhesion between such boxes, and the axles running in them. This I obviate by casting a recess across the lower side of that part of the box which receives the gudgeon, and filling said recess with a strip of brass, which may be confined by making its edges dovetailing, or by other means. This is represented at Y, Fig. 6.

I will here observe that in my plan of gearing and connecting the truck and driving wheels, there may be two trucks, instead of one truck and one pair of driving wheels; and such two trucks may be connected in the same way. I will also remark

that by making all the wheels of the same size in one, or both trucks, the connection between them and the connecting axle may be made by forming a crank on the center  
5 of each of those axles, and using a connecting rod common to each of these cranks, but I think the mode of gearing exhibited by me in Fig. 3, is preferable.

10 Having thus fully described the respective improvements in the locomotive engine which I desire to secure by Letters Patent, what I claim therein is as follows:

1. I claim the manner of combining and arranging the connecting axle placed inter-  
15 mediately between the truck wheels, and passing through guide boxes attached to the truck frame, substantially as set forth; while at the same time the parallelism of the said connecting axle of the driving  
20 wheels is maintained by the means herein described, or by arrangements similar there-

to in their nature and results; by which arrangement and combination of parts the connecting axle has a free vibration vertically with the truck frame, while the truck  
25 frame is also free to vibrate horizontally.

2. I claim the substituting a metallic stuffing, consisting of wire, instead of cotton, hemp, wool, or the other fibrous materials ordinarily employed, whether the  
30 same be used around the stems of valves, in stuffing boxes, or in other situations where such packing is required.

3. I claim the combining of spiral springs with the cylindrical boxes and pedestals for  
35 the wheels of locomotive cars &c., constructed and arranged as herein set forth.

M. W. BALDWIN.

Witnesses:

JOHN BINNS,  
PETER WINEMOT.