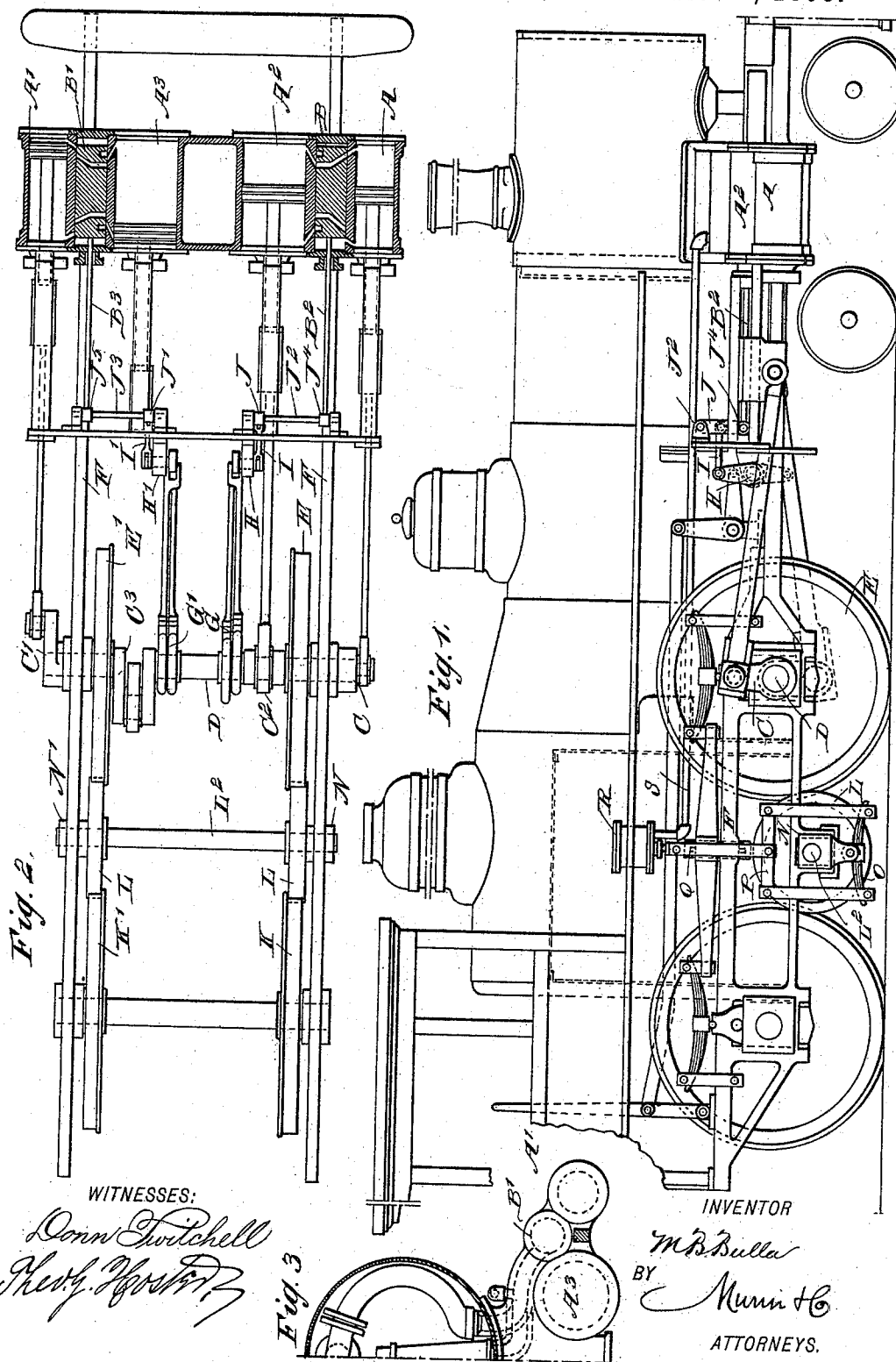


(No Model.)

M. B. BULLA.
LOCOMOTIVE.

No. 535,668.

Patented Mar. 12, 1895.



UNITED STATES PATENT OFFICE.

MELBERN B. BULLA, OF YUMA, ARIZONA TERRITORY.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 535,668, dated March 12, 1895.

Application filed May 3, 1894. Serial No. 509,904. (No model.)

To all whom it may concern:

Be it known that I, MELBERN BERNIE BULLA, of Yuma, in the county of Yuma and Territory of Arizona, have invented a new and Improved Locomotive, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved locomotive, in which the connecting side bars for the main and rear drive wheels and the counterweights of the latter, are entirely dispensed with, so that the locomotive will run very smooth at any speed, is not liable to roll at a high speed or nose on a hard pull, as is so frequently the case on locomotives heretofore constructed.

The invention consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the frame and engine with the cylinders in section, and Fig. 3 is a transverse section of part of the front end of the locomotive.

The locomotive engine is provided on opposite sides with the two high pressure cylinders A, A', connected with the steam compartment of the boiler and by valves B and B' with the low pressure cylinders A² and A³ respectively, arranged between the high pressure cylinders, as plainly indicated in Fig. 2. The exhaust steam from the high pressure cylinders A and A', is transmitted by the valves B and B' to the low pressure cylinders A² and A³ respectively, from which the exhaust steam finally passes through the usual stand pipe into the stack of the locomotive as indicated in Fig. 3.

The pistons in the high pressure cylinders A and A' are connected in the usual manner with the crank arms C and C' respectively, secured on the drive shaft D carrying the front drive wheels E and E' and journaled in suitable bearings on the locomotive frame F, the side bars of the said frame being arranged outside of the drive wheels E and E', as indicated in Fig. 2, so as to permit the use of a large fire box and increased heating surface

in the boiler. The pistons in the low pressure cylinders A² and A³ are connected in the usual manner with the crank arms C² and C³ formed on the shaft D so that the power of all the cylinders is directly transmitted to the shaft D carrying the front drive wheels E and E'.

As indicated in Fig. 2, the several crank arms C, C², C³, C' stand at angles one to the other, so that the power is equally applied on the shaft at all times, and consequently a uniform motion is given to the drive wheels E and E'.

The sets of eccentrics G and G' on the drive shaft D are connected in the usual manner with the rocker arms H and H' respectively, connected by links I and I' respectively, with the arms J and J' respectively, held on transversely extending rods J², J³, respectively, journaled in suitable bearings in the frame. On the shafts J² and J³ are secured the downwardly extending arms J⁴ and J⁵ respectively, pivotally-connected with the valve stems B² and B³ respectively, operating the slide valves B and B' respectively, between the high and low pressure cylinders, as above described. It is understood that this construction is necessary owing to the low position of the slide valves B and B', and the device gives the valves a quicker motion, opening the ports wider and quicker than if connected direct to the top of the rocker arms. The front drive wheels E and E' are connected with the corresponding rear drive wheel K and K', by friction wheels L and L' respectively, secured on a transversely-extending shaft L² mounted to turn in suitable boxes N and N' fitted to slide vertically in suitable bearings arranged in the side frames F of the locomotive. See Fig. 1.

The lower ends of the bearings N and N' are engaged by springs O, each held in a frame P connected at its upper end with the piston rod Q of the piston in a steam cylinder R arranged on the locomotive, the said cylinder being connected by a steam pipe S with the corresponding steam chest of the high pressure cylinder A or A', so that whenever live steam is admitted to the said steam chest of the high pressure cylinder, then it also passes through the pipe S into the lower end of the cylinder R to force the piston therein in an upward direction, to lift the frame P and springs O

to move the boxes N and N' upward and to cause the friction rollers L and L' to move in firm frictional contact with the peripheral surfaces on sets of front and rear drive wheels E, K and E', K'.

When the steam is shut off from the steam chest of the high pressure cylinders, by the engineer closing the throttle, then the pressure on the piston in the cylinder R is released and the frame P can slide downward by its own weight, so as to relieve the pressure on the spring O and boxes N to permit the friction wheels L and L' to move out of frictional contact with the sets of front and rear drive wheels. As shown in Fig. 1, each friction wheel has a diameter about six inches greater than the distance between the periphery of the front and rear drive wheels, and each friction wheel is placed below the center of the drive wheels, as indicated in Fig. 1.

Now, it will be seen that by the construction above described, the friction wheels L, L' are held up against the drive wheels E, K, E', K', with sufficient force to prevent their slipping, and when the steam is shut off from the high pressure cylinders, then the friction wheels will drop down clear of the drive wheels and allow the engine to run with diminished friction.

By the construction described, no side rods and no wrist pins in the drive back wheels K, K', are necessary and no counterbalancing is required.

The locomotive described is designed to avoid the sledge hammer blow struck by the counterbalance of the drive wheels at every revolution, especially at high speed in locomotives as now constructed.

The locomotive described will run very smoothly at any speed, is not liable to roll at a high speed or nose on a hard pull, and consequently will greatly lessen the wear on the track and machinery.

The engine described will cause a saving of fuel, running, repairs, repairs to tracks, and bridges and re-construction of parts.

As described above and shown in the drawings the friction wheels are applied between the front and rear drive wheels, but on locomotives with more drive wheels, friction wheels are employed between the front and second pair of drive wheels, between the second and third pair of drive wheels, &c., that

is a friction wheel between adjacent drive wheels.

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

1. A locomotive provided with drive wheels running in contact with the rails, the shaft carrying the forward drive wheels being operated directly from the pistons of the engine cylinders friction wheels between adjacent drive wheels, and means, substantially as described, for moving the said friction wheels in contact with the said drive wheels whenever the throttle is opened, substantially as shown and described.

2. A locomotive provided with high and low pressure cylinders and having the shaft of its forward drive wheels connected with the pistons of the said cylinders, friction wheels located between adjacent drive wheels below their centers and adapted to transmit motion from one of the said drive wheels to the other, vertically adjustable boxes in which the shafts of the said friction wheels are mounted to turn, a steam cylinder arranged on the locomotive and connected with the corresponding steam chest of the high pressure cylinder, a spring engaging the lower end of each of the said adjustable boxes, and a frame in which said spring is held, the said frame being connected at its upper end with the piston of the said steam cylinder, substantially as shown and described.

3. A locomotive provided with an engine comprising two high pressure cylinders arranged on opposite sides of the engine, two low pressure cylinders arranged adjacent to the high pressure cylinders, a valve arranged between the corresponding high and low pressure cylinders and connecting the same, rocker arms operated from the main drive shaft, links connected with the said rocker arms, arms held on transversely extending rods and connected with the said links, and downwardly extending arms secured on the said rods and pivotally connected with the valve stems, substantially as shown and described.

MELBERN B. BULLA.

Witnesses:

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