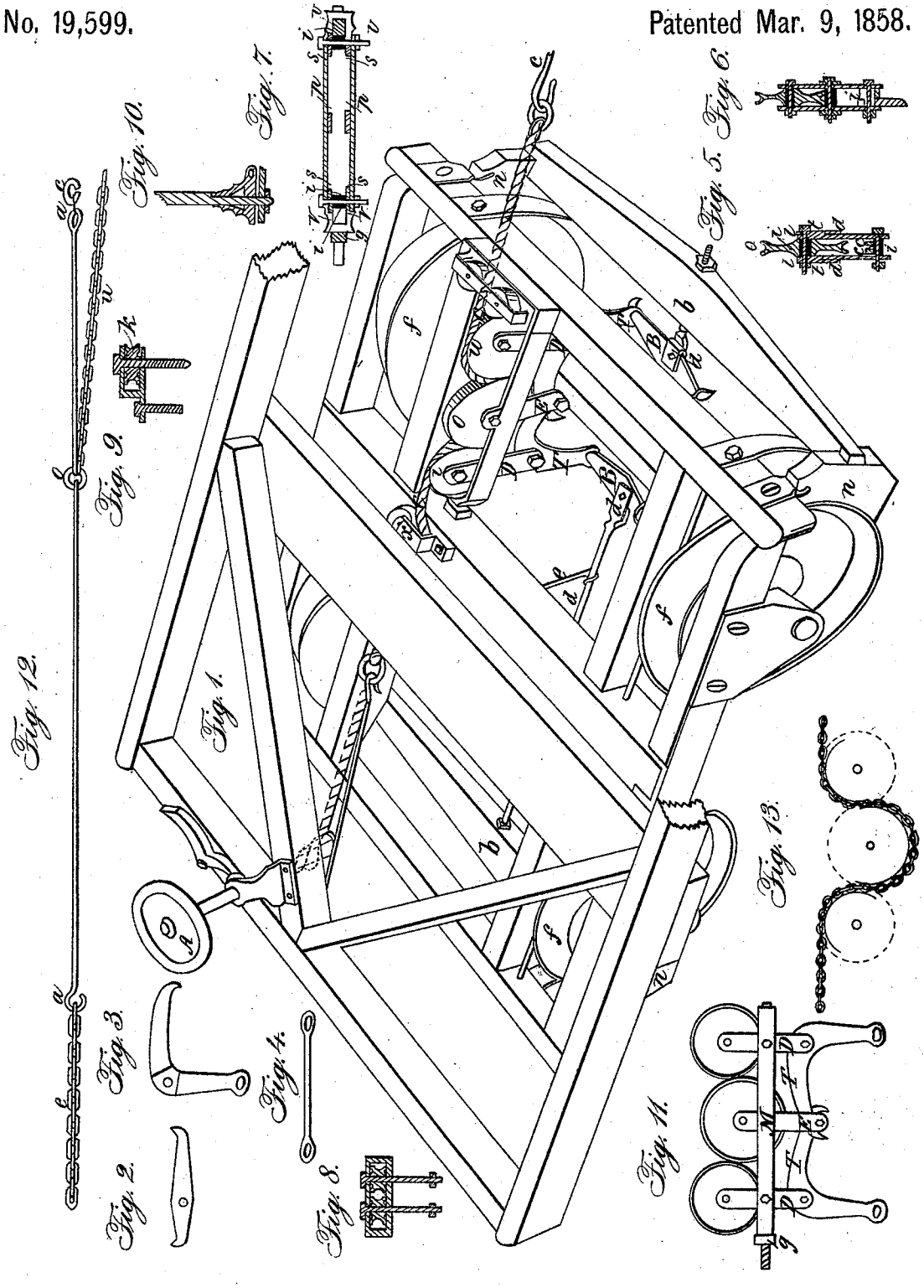
S. M. WHIPPLE.

Car Brake.

No. 19,599. Patented Mar. 9, 1858.



# UNITED STATES PATENT OFFICE.

STEPHEN M. WHIPPLE, OF NORTH ADAMS, MASSACHUSETTS.

## RAILROAD-CAR BRAKE.

Specification of Letters Patent No. 19,599, dated March 9, 1858.

*To all whom it may concern:*

Be it known that I, STEPHEN M. WHIPPLE, of North Adams, in the county of Berkshire and State of Massachusetts, have made certain new and useful Improvements in Machinery for the Transfer of Power to the Brakes of Railway-Cars.

The nature of my invention consists in the use and application of all the forces of a moving train to counteract its momentum and bring it to rest.

I term my invention a train brake, and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure I is a perspective view of a truck, with my improvements applied, complete in all the parts upon a scale of $\frac{3}{4}$ of an inch to the foot. Observing this scale, I proceed to represent the several parts, and the function which each part performs; Fig. II is a lever, for actuating the brake-bars of the truck, and from its relation to other parts, I term it a horizontal lever; Fig. III a quadrant lever, for actuating the horizontal levers; Fig. IV a tie for uniting the short arms of these levers; Fig. V, a vertical, and central section of the sliding center, for actuating the quadrant levers; in which are represented cross sections of the tongues of said levers *c c*, and also of the frame *d, d;* independent of these, may be seen a section of pulley *o*, side plates *l, l*, with shoulders *t, t*, ferrules *i* or *i*-bolts and nuts, all the parts constituting one piece; Fig. VI, a like section of one of the fulcrums, and its parts, upon which the sliding center and the quadrant levers obtain their bearings; Fig. VII a central, and longitudinal section of the frame, or supporter of the several parts in the truck, with cross sections of the sliding center *p, p*, fulcrums *s, s*, or *s, s*, and their shoulders *v, v*, or *v, v* ferrules *i*, or *i* (for inner shoulders,) bolts, nuts, &c.; Fig. VIII a vertical, and central section of a fairleader, with pulleys *k, k*, for protecting the machinery when the truck is under the brakes at different angles, and also to serve as a fixed point of contact, in the event of breaking the operating connection; Fig. IX, a like section of another fairleader, with one pulley *k* for a similar purpose; Fig. X a vertical and central section of a cone, as combined with the windlass staff, for taking up the slack of the train; Fig. XI, a side view of the parts bolted together before an application is made to the truck, in which are represented the sliding center E, quadrant levers T, T, fulcrums D, D, frame M, with screw and nut *g*, for holding the whole fast in the truck frame; Fig. XII, the main operating connection, including eyes, links, and hoops, for continuing the same from car to car, by a corresponding hook and link *c, a*, from the opposite truck, and also, the branch chain *u*, of the operating windlass; Fig. XIII, the peculiar form given to the chain in passing through the pulleys *i, o, u*, Fig. I.

*Construction.*—As preliminary, locate the line of the operating connection as near to a line drawn through the center of the train, as the construction of the cars around the draw-bars, and ring-bolts will allow. Having determined this line, the number of inches is the length of the long arms of the horizontal levers, their fulcrums being in a line drawn through the center of the brake-bars. The length of the frame, or supporter of the parts in the truck M, Fig. XI, is determined by the distance between the end-piece and transom, to which it is made fast by a nut and screw, at G, Fig. I.

The combination of all the parts as a whole, is adapted to the truck in common use, and the operation, to the stretch of the train under the brakes. With these preliminaries, and a due observance of the scale adhered to in the drawings herewith annexed, it is sufficient to remark, that, for bolts, I use $\frac{5}{8}$ iron; and for ferrules, gas-pipe, one inch in diameter, $\frac{3}{4}$ bore, except for the ferrules in the quadrant levers; these are made of cast iron, with a shoulder, as seen at *i*, Fig. VI. For connections in the truck, I use $\frac{3}{4}$, or $\frac{7}{8}$ iron, with screws and nuts thereon, for adjusting the brakes to the wheels. For operating connection, chain and rod, chain, short, straight, link, $\frac{3}{8}$ iron, rod, $\frac{1}{2}$ inch, hooks $\frac{5}{8}$ iron, coupling hook, $\frac{3}{4}$ iron, flattened to give strength to the back. Length of chain, $2\frac{1}{2}$ feet more than enough to pass from one fairleader to the other, through the pulleys *i, o, u*, the balance rod, including eyes, links and hooks; the whole connection extending from the end of one draw-bar to the end of the other. For purposes of adjustment, unite the connecting rod *c*, Fig. I, from truck to truck, under the

car, by hooks and links, or by swivel and screw. The fairleaders *x*, and *y*, Fig. I, are made of cast iron and elevated to their position by blocks of wood, and are there secured by bolts and screws, as seen in the drawings, Figs. VIII, and IX.

*Application.*—Having bolted the parts together, as seen at Fig. XI, proceed to take the following measurements, viz., from the line of the operating connection, measure downward upon both end-piece and transom of the truck 10½ inches, and bore holes to admit the frame, insert the longer end first, and then, plant the shoulder of the opposite end against the end piece of the truck. Set the nut G, firmly against the transom timber; unite the quadrant levers T, T, with the horizontal levers B, B, and their fulcrums by jaws and connecting rods *d*, *d*, with the brake-bars *b*, *b*, of the truck; connect the short arms of these levers by the tie, Fig. IV; suspend the longer connection by a hook *e;* set the springs; adjust the brakes, (shod with iron, surface, 3 by 15 inches) to the wheels; make fast the fairleaders *x*, *y*, Fig. I, upon the end piece of the truck, and also, upon the transom, in the line of the opening connection. Secure the cone, Fig. X, to the windlass staff in common use; unite the chain to the operating connection at *o*, Fig. XII, by a coupling hook; properly suspend said connection from the body of the car; pass the chain as connected at *a*, Fig. XII, through the fairleader *x*, Fig. I, over the fulcrum pulley *i*, under the pulley *o*, of the sliding center, over the other fulcrum pulley *u*, through the other fairleader *y*, link it to the connecting rod *c*, and the machinery as applied to one truck, is ready for operation. Duplicate the same from truck to truck, until all the cars composing the train are thus equipped.

*Connections from truck to truck, under the car:*—Unite the connecting-rod *c*, at the center, as specified under construction. Suspend the rod by rings in staples driven into the cross timbers of the car-body.

Upon all the trucks, apply springs of a capacity that will allow the operating chain to pass through the pulleys *i*, *o*, *u*, without actuating the brakes, when the train is started, after braking. To this end, springs of a double capacity must be placed upon all second class and baggage cars, and tenders to engines also, if the machinery is applied to them; in which case, the mechanism of one truck is used in one direction, and that of the other, when the engine is reversed and coupled to the other end of the train, the operating chain of one truck being attached to the windlass of the tender upon the fireman's side, and that of the other truck, to a windlass upon the opposite side of the tender; one or both being used in braking the tender when detached from the train; and also when coupled with it, in taking up the slack, in conjunction with the brakeman upon the rear end of the train, or, in the event of incapacity of springs, to relieve the wheels of the brakes when starting from a station, the fireman can effect this object, by pulling the operating connection forward, by the windlass in contact with said connection.

*Operation.*—First, confined to one truck: Set up the windlass A, Fig. 1, which brings the hook of the connecting rod *c*, against the fairleader *y;* there being no other yielding point, the sliding center E is forced upward, and being connected with the tongues of the quadrant levers T, T, and their vertical arms with the horizontal levers B, B; their short arms being united by the tie, Fig. IV, and also, their fulcrums with the brake bars *b*, *b*, of the truck, by connections *d*, *d*, the brakes *n*, *n*, and *n*, *n*, are applied to the wheels *f*, *f*, and *f*, *f*, with a force corresponding to the power applied to the operating connection. Second, to one car, or two trucks: As preliminary to operation, take up the slack in the operating connection, upon the cone of the windlass and there hold the chain by the spring and ratchet; the part which actuates the brakes, being wound upon the windlass staff above the cone. Set up either of the windlasses, but whichever it is, the slack in the connection should first be wound thereon; then, the operation may proceed; the windlass opposite the one operated, or the nearest fairleader upon the transom of the truck, becomes the fixed point of contact, and the operation of the brakes of both trucks will correspond with the operation of the brakes of one truck; but, with this difference, viz., there are two points of transfer, instead of one, and the power applied to the operating connection diminishes in efficacy, as it proceeds from the truck nearest to the windlass operated. And yet, as a train brake, when the inherent forces of the train come into action, all the wheels under the brakes, united with the continuous operating connection, are retarded with a uniform force: Third, to a train of five cars:—The operating connection being continuous from the rear windlass of the last car, to the tender of the engine, is here made fast to an eye-bolt in the end timber. Said connection must be so adjusted under each car, as to allow the wheels to run free of brakes, and yet allow no unnecessary slack in said connection. The train is in motion:—The brakeman is at the rear windlass of the last car; the train approaches a station; the engineer "shuts off steam"; the cars run together; the train is perhaps two feet shorter, than when the engine was under head of steam; the brakeman takes up the slack on the cone of his

windlass, and applies the brakes effectually to the last truck in the train, and partially to all the trucks preceding. The last car reacts; the retarding force of which elongates the train, thereby, giving an increased tension to the operating connection, which receives a still greater tension, by a counter force, the momentum of the train, which effectually brakes the forward end of the train. The engineer feeling the effect of these forces upon the speed of his train, gives steam to his engine, and all the forces of the train combined, still further elongate the train at every yielding point, (the springs in the draw-bars;) this accumulating force transferred to the brakes, gives an extreme tension to the operating connection, and hence, the greatest abrasion upon all the wheels under the brakes—but, no sliding wheels, the great desideratum, in braking railway carriages.

Shutting off steam is not indispensable to good braking. To illustrate, suppose a train of six cars is running at time speed. The brakeman sets up the rear windlass of the fifth car, which forces the rear end of the train together; the brakes being thoroughly applied to the truck nearest to the windlass operated and partially to all the trucks preceding, this car reacts, and itself becomes brakeman to all the cars in advance of it, by stretching the train at every draw-bar. The engineer finding the speed of his train diminishing gives more steam to his engine, while the brakeman sets up the forward windlass of the sixth car, the retarding force of which, combined with the motive power, transferred to the brakes, will counteract the momentum of the train and bring it to rest, in less time than it can be done, with the brakes in common use, operated by three brakemen, in the usual manner. But the most effectual braking is realized when two brakemen operate the rear and forward windlasses of the last two cars in the train, the engineer shutting off, and at the proper time giving steam, the fireman having assisted in taking up the slack of the train. Operation in backing the train: The brakeman takes up the slack; the engineer gives steam ahead, and thus, the engine becomes brakeman.

Mechanically, the novelty of my invention consists in a combination of two quadrant levers T, T, and two horizontal levers B, B, with each other, and with the brake-bars of the truck, and also, with the operating connection through the fulcrums D, D, and sliding center E, for the transfer of any and all the forces of a moving train, from the operating connection to the brakes. These forces in the order of their use, are, first, external, and may be divided into manual, and mechanical, or the force generated by mechanical means; and second, inherent, which divides itself into three separate and distinct forces, viz., retarding force, the force of momentum, and the motive force, all of which forces the operators of the train may transfer to all the brakes, in quick succession; and herein is my claim which I desire to secure by Letters Patent:

What I claim is—

The combination of levers, pulleys and chains operated and arranged substantially as described, by which a brakeman on the rear end of the last car of the train is enabled to brake the train.

In testimony whereof I have hereunto set my signature, this twenty-seventh day of January, A. D. 1858.

STEPHEN M. WHIPPLE.

Witnesses:

THOS. H. JOHNSON,

B. F. ROBINSON.