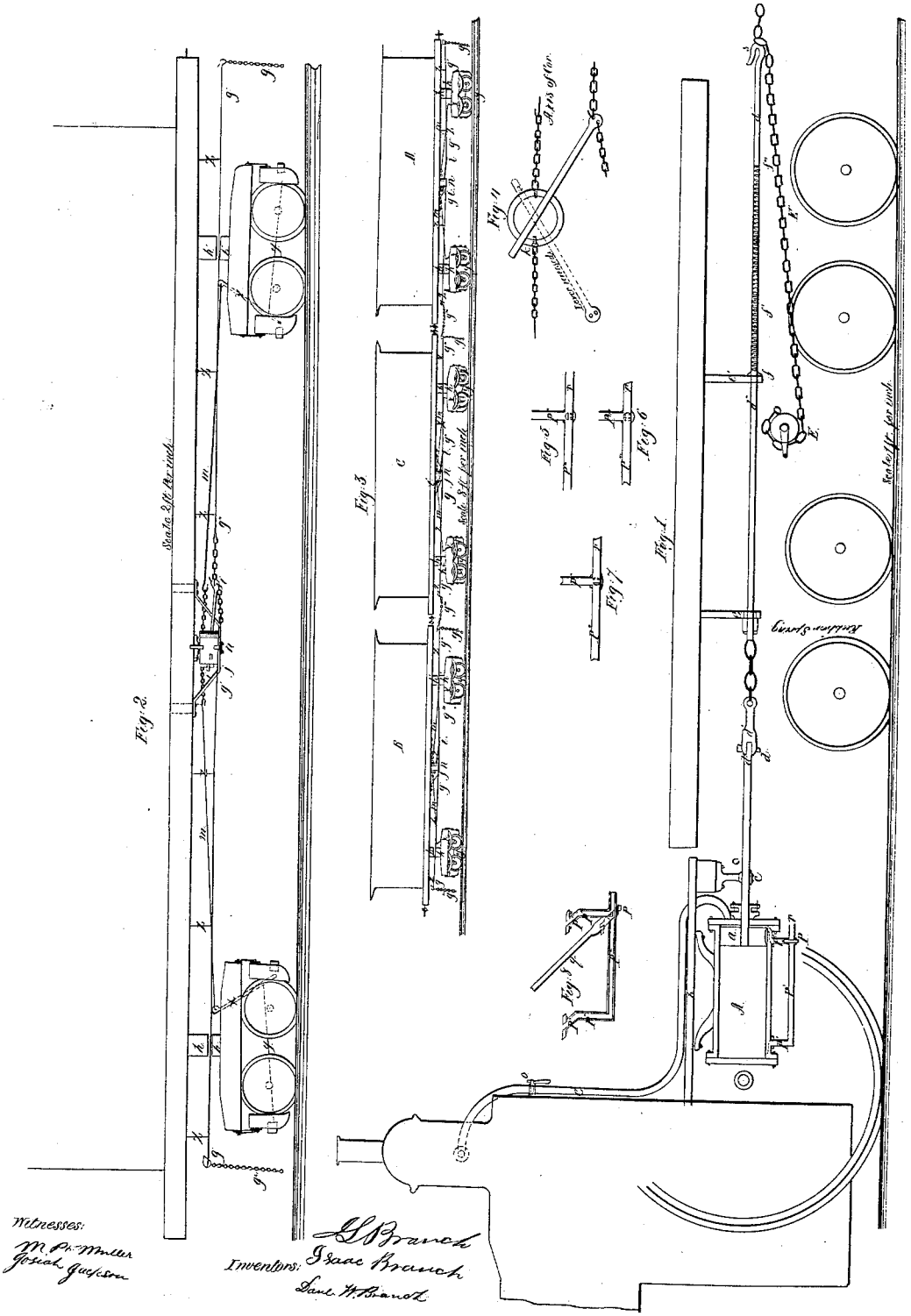
J. L., I. & D. W. Branch,

Steam Brake.

No. 19,012. Patented Jan. 5, 1858.



UNITED STATES PATENT OFFICE.

JOHN L. BRANCH, ISAAC BRANCH, AND DANIEL W. BRANCH, OF CHARLESTON, SOUTH CAROLINA.

IMPROVEMENT IN RAILROAD-CAR BRAKES.

Specification forming part of Letters Patent No. **19,012**, dated January 5, 1858.

To all whom it may concern:

Be it known that we, JOHN L. BRANCH, ISAAC BRANCH, and DANIEL W. BRANCH, of the city and district of Charleston, in the State of South Carolina, have invented a new and Improved Mode of Applying at one Point on the Train, and Continuously, Brake-Blocks to Railroad-Car Wheels; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 shows the power and means of its application, also the drum and chain to be hereinafter described; Fig. 3, the general connection of the brakes, levers, &c.; Fig. 2, the arrangement on a single car on a larger scale; Fig. 4, a plan or cross-section of the drum, lever, and chains, the dotted lines showing the position of the lever reversed, as will more fully appear herein, and to the letters of reference marked thereon.

The nature of our improvement consists, first, of the immediate application of steam-power by the engine-driver to the brake-blocks on all cars having brakes with our connections, &c.; secondly, of a drum secured to the bottom of the tender and supplied with a chain, the use of which will hereinafter more fully appear; and, thirdly, the manner in which the brake-levers are worked, whether the train be moving backward or forward. This, all taken together as a system, secures to the engine-driver full control of the brakes independently of the tardy attention of brakemen, none of whom, with our arrangement, are needed on the train either for ordinary or extraordinary occasions.

We do not propose to do away with the ordinary hand-brake on the tender to locomotives; and just here we will state that by our arrangement, carried through and attached to the tender, (which can be very easily done,) the two firemen may be enabled to apply the brakes without the use of steam, and also that the power of the present hand-brakes on cars may be vastly increased by the use of our drums, levers, rods, and chains. We desire to incorporate these ideas in this our application.

To enable others to make and use our improvement, we will proceed to describe its c n struction and operation.

We construct a steam-cylinder, A, piston and rod *a a'* for same, and secure it to the under side of the frame *b* and in rear of the fire-box, or at any other convenient point of the locomotive. The pipe *c* being attached, the one end to the boiler or dome and the other fixed into or near the back head of the cylinder A, a steam communication is established between the two. The piston-rod *a'*, having a guide-box, *c'*, has attached to it by means of a slot and key, *d*, a rod, *d' d'' d'''*, (broken by a few links of chain,) which, being supported by hangers *e e'*, &c., passes under and to the back end of the tender, and terminates with a hook, *s*. The object of such connection at the end *a'* of piston and broken rod *d' d''*, &c., is to admit of their disconnection when the locomotive is cut loose from the tender, and the object of the short chain at the break of rod *d'*, &c., is to prevent injury or strain to the piston and piston-rod *a a'* during any lateral or up-and-down motion which the locomotive may have while running. The rod *d' d'' d'''* is mounted with a spiral spring, *f'*, which abuts one end against the button or loose washer *f* to prevent injury or abrasion to the end of the spiral against the hanger *e'* during the motion of the rod produced by the counter-motion of the tender and car next behind, and the other end of the spiral bears against the fixed collar *f''*.

The use of the spiral will be explained in the proper place, although it may possibly in practice be unnecessary.

Passing now to Fig. 2 and to the left, we have a few links of stout chain, *g'''*, connected, through an eye formed for the purpose, with the hooked rod *g'*, which rod, passing between bolsters *h h* of car and through hangers *z z z*, &c., terminates, having at its end a few links of chain and hook. This hook hooks into one of the two eyes provided for the purpose in the end *i* of the long arm of lever *i i'*, which lever passes loosely through the hollow cast-iron drum *n*, and is kept therein by a spring-key, K. From the other eye of lever *i i'* we have a second rod, *g''*, with chains similar to the rod and chains *g' g* passing through hangers, &c., to the rear end of the car. The drum

n has in opposite sides an eyebolt, in which are fixed a few links of chain to connect with the hooked rods *m m*, which pass from the brake-levers *x x*. The drum *n*, having an axis, as shown in the diagram, is permanently secured near the center and beneath the car to the floor-beams by means of heavy stay-irons *j*.

It will be perceived, on inspection of the drawings, Fig. 3, that the rods *g' g' g'* do not extend to the end of the platforms of the cars by the length of the cylinder or stroke of the piston, for the reason that when the levers *i i' i i'*, &c., are reversed in the drums *n n*, &c., (as will appear more fully in a subsequent part of this specification,) said rods will not project beyond the end of said platforms. Were it not so arranged, the rod *g'* of car B, when it becomes the rear car, (the engine and tender being transposed to car D,) would project out beyond the length of the car, which is objectionable. It will also appear that we have short extra chains attached to the rods *g' g' g'' g''*, &c., at or near the front and rear end of each car, and also that said rods terminate in hooks. The object of these chains and hooks is to secure a connection of the brakes of one car to those of another without reference to which ends of cars come together.

Having described all the connecting-rods and chains, lever, and drum, &c., (the lengths of which will require care and attention properly to adjust,) for one car, B, for example, we state that the cars C and D are arranged in the same way, the lengths of rods varying, if necessary, to suit the lengths of cars and trucks. We will now proceed to demonstrate the coupling or connecting of the brakes of one car with those of another and also the operation of the system of continuous brakes. A train—cars B, C, and D, for example, Fig. 3—being coupled together at the bunters, the end to the right being the rear, an attendant or greaser or any one else goes to the junction of the cars successively, (beginning at either end of the train,) passes a link of the chain *g'''* over the hook on rod *g'' g''*, at the junction, for example, of the cars D and C, and thus connects the brakes of car D with car C. The connection of the brakes on car C is next made with the car B, and those of car B with the tender at the hooks *s*, Fig. 1. Having passed over the length of the train, all the brakes are now connected, and the train is ready for motion. It moves off. When it becomes necessary to stop, the engine-driver closes the throttle-valve, turns the cock O of pipe C, Fig. 1, much or little, as the exigency of the case demands, thus admitting steam into the cylinder A against the piston *a*, causing the piston to move up or forward, in the cylinder, drawing with it, by its connections, the hook *s*, which is connected with the chain and rod *g* and *g'*, Fig. 3, car B. As the said rod *g' g'* moves forward, it draws with it the end *i* of lever *i i'*, which, as it passes through the drum *n*, causes it to revolve about one-third ($\frac{1}{3}$) its circumference on its axis, thereby winding the chains on the brake-rods *m m* partly around the drum, by which winding the upper ends of both brake-levers *x x* are drawn toward the center of the car, and by the ordinary arrangement and connection of the brake-blocks with the brake-levers *x x* the said brake-blocks are made to hug or clamp the wheels. The degree of the intensity of this clamping depends in part upon the nicety as to length of the brake-levers, rods, &c., and their coupling or connection with the drum *n*, and partly upon the distance which the piston is made to travel in the cylinder. The engine-driver will be guided in this matter just as he now governs the brakes by his whistle, letting off or on steam, according to the proximity of his train to the point at which it must stop.

The tautness of the rods and chains *m m*, &c., connecting the brake-levers *x x* to the drum *n*, must be the same on either side of said drum. It must be such, also, as that when the piston *a*, Fig. 1, has traveled one-third ($\frac{1}{3}$) to one-half ($\frac{1}{2}$) the length of the cylinder the brake blocks will begin to clamp the wheels, so that when the piston is within about one-third ($\frac{1}{3}$) its stroke from the forward end of the cylinder the train is sufficiently checked for ordinary stoppages. Under this arrangement it will be perceived that the piston has sufficient distance to go to cause the blocks to hug so tightly the wheels as to lock them. This is a provision for extraordinary occasions where great and imminent danger is near.

It will not do to have the couplings carelessly made. One part or member of the same name or office must not be longer as to slackness or tautness than the other of the same car. In a word, there must be a general harmony throughout as to tautness of rods and chains of each car. Simultaneously with the operation of the brakes of car B, (as just now set forth,) a similar operation is going on in the case of the brakes of cars C and D, so that by the arrangement which we propose every brake-block on the train connected and arranged upon our plan or improvement is brought to bear against its respective wheel at the same instant. At the proper time (to be judged of by the engine-driver) he shuts off with the cock O, Fig. 1, the issue or current of steam into the cylinder, and the train gradually or abruptly, as the case demands, is stopped. He, (the engine-driver,) by means of a convenient rod or handle, *q*, Fig. 8, now turns the exhaust-cock *p*, which has a T-opening (see Fig. 5, plan or section of) in the pipe *p' p''*, &c., Fig. 8, one-quarter ($\frac{1}{4}$) or ninety degrees around, and the said T-cock has the position as shown in Fig. 6, (plan or section of.) The steam in the cylinder which caused the piston to move forward now issues through the pipe *p' p''*, &c., Fig. 8, and into the front head of the cylinder A, against the piston *a*, producing an equilibrium of pressure against the piston. This done, he (the engine-driver) now turns the T-cock *p* one-

half (½) or one hundred and eighty degrees around, and the position of the openings becomes as shown in Fig. 7, (plan or cross-section of.) Then the remaining steam back of the piston escapes through the exhaust-pipe *r*. During the escape of this steam the piston is forced back to its original place by the expansion of the steam which now occupies the pipe *p'''*, &c., from the T-cock forward, and the space in the front end of the cylinder A. The piston now being at its place, the T-cock *p* is turned to its first position, (see Fig. 5,) and the steam in the front part of the cylinder and pipes escapes, while the T-cock is left ready for another application of the brakes.

We have introduced and exhibited the spiral spring *f'* for the performance of the same office as that which the steam, as just set forth, has been made to perform. The operation of this spiral spring during the putting on and letting off of the brakes is so simple as not to require any further notice here. The use of the one or the other plan, or both, we will allow to depend upon the preference of the agents of such railroad companies as may purchase our patent. The piston now being back to its place, the wheels of the trucks are relieved of the heavy pressure from the brake-blocks, and of all pressure from them, by attaching simple plates (springs) of spring-steel, now in use, to each truck-frame, thereby bringing every part of our arrangement to or near to its former position. These springs, being bolted to the front and back cross-timbers of each truck-frame, are brought to bear on the blocks by pressing against the cross-timber which connects said blocks together. The levers *i i'*, &c., are arranged and kept parallel with each other and at an angle with the line of the train, not parallel with it, but as exhibited in the diagram, Fig. 4. We have demonstrated a case in which a train is going from one terminus to the other. We will now proceed to show the operation of our brakes for a return trip, and cutting loose the engine and tender, we transpose them to the other end of the train without turning the cars and connect to the car D, the front end of the train in the former case now becoming the rear. A man—the attendant to the train, for example—proceeds to the center of the different cars successively, disconnects the rods and chains *g' g''* *g' g''*, &c., from the end *i* of levers *i i'*, &c., takes out the spring-key K (see Fig. 4) from the other end of the lever or levers, withdraws the lever, and (taking one car at a time) inserts it into another hole prepared for it in the drum *n*, thus giving the lever the same angle with the line of the train which it had before, but in a reversed direction. Reversing all the levers and connecting the system through and at the hooks *s*, Fig. 1, with the piston-rod and its connection, our brakes are now prepared for action as they were before. Our improvement is equally applicable to freight-trains, whether of box or platform cars. Cars having brakes, however, should be at the front end of the train.

It becomes our duty now to refer to the drum and chain E E', Fig. 1. This chain is for the purpose of effecting a connection of our system with the rod *d' d'' d'''* at hook *s* in case at any time it becomes necessary to introduce between the regular train of cars, B C D, for example, and the engine and tender a car which is not provided with brakes on our plan. This car being provided with hangers, the chain (being of sufficient length) is passed under the car through the hangers and connected by hook on the proper rod, *g'* or *g''*, Fig. 3, with the brakes brought to a proper tautness, and the hook *s*, Fig. 1, is placed in one of the links, as seen in the drawings. This drum E is prevented from turning, thus unwinding the chain when it is not required by means of a ragged wheel and dog or any other way to effect the object desired.

It will be perceived that we have given no dimensions for anything.

In this application we do not claim as original with us the idea of applying steam-power to the operation of brakes in the abstract.

We do not claim in general terms the idea of drawing the upper end of the brake-levers *x x*, &c., toward the center of the car (thus clamping the wheels with the brake-blocks) by a winding up of the chains at the ends of rods *m m*, for this has been done already by means of a rod passing up into a car with a wheel fixed at its upper end and worked by a man, usually called a "brakeman;" but

What we claim, and desire to secure by Letters Patent, is—

1. The drum arranged and worked as we have fully set forth in every particular in our specification and delineated in our drawings.

2. To operate the brake-blocks of a continuous train of cars by means of a steam-cylinder or hand-power, in combination with the drums, levers, and chains, substantially and specifically as above set forth.

3. The drum E, Fig. 1, and surplus chain E', the object and use of which are fully and substantially set forth in the specification, as are also our other claims.

JOHN L. BRANCH.
ISAAC BRANCH.
DANL. W. BRANCH.

Witnesses:
M. P. MULLER,
JOSIAH JACKSON.