

J. H. FOX.

BLOCK SYSTEM FOR AUTOMATICALLY OPERATING AIR BRAKES.

No. 530,937.

Patented Dec. 18, 1894.

Fig 1

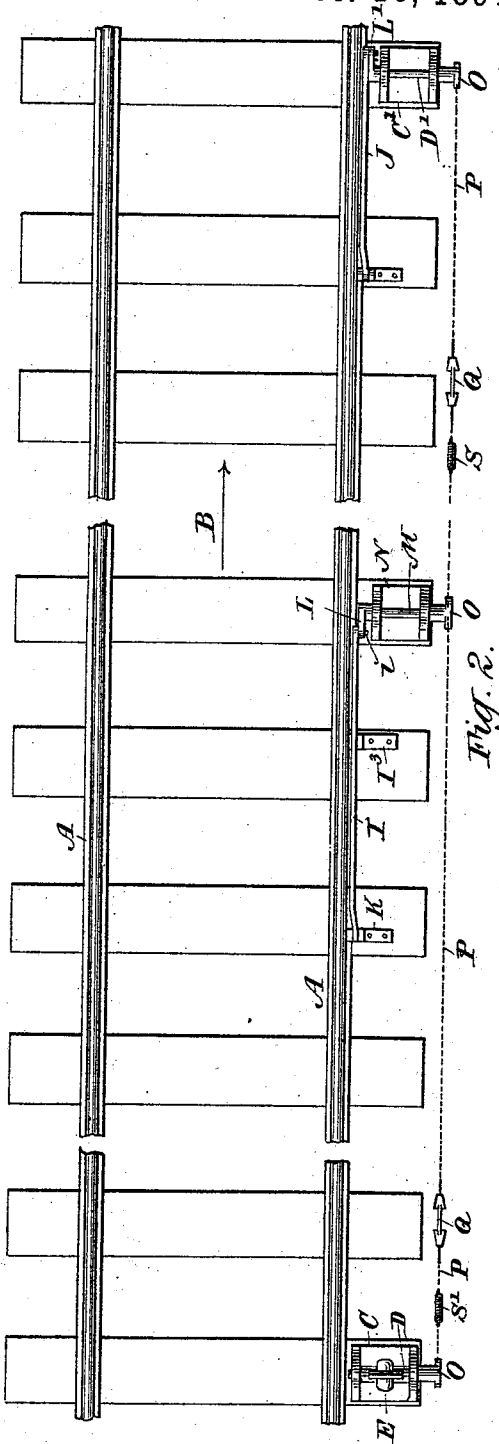
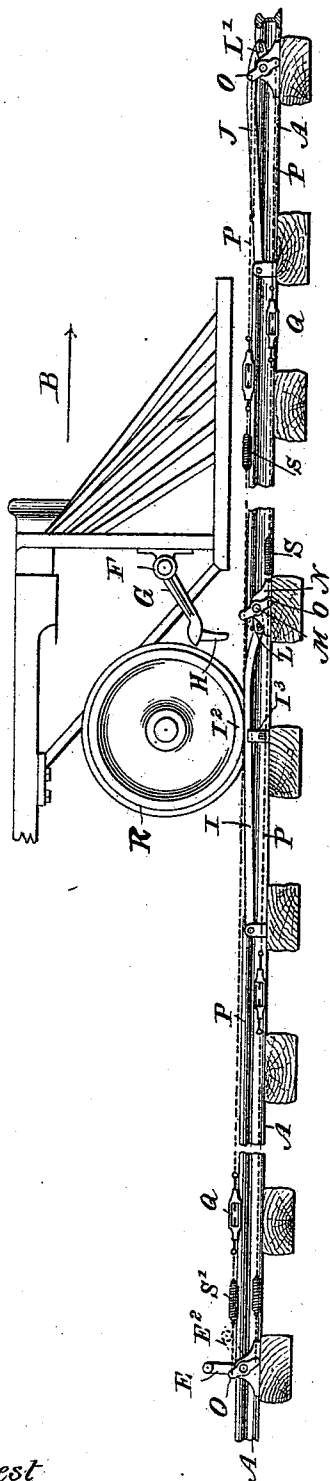


Fig. 2.

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(No Model.)

3 Sheets—Sheet 2.

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Fig. 3.

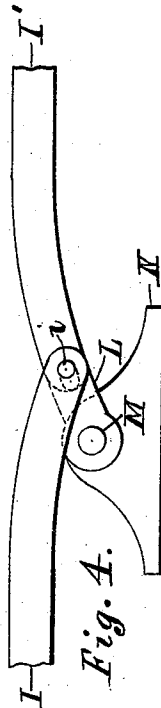
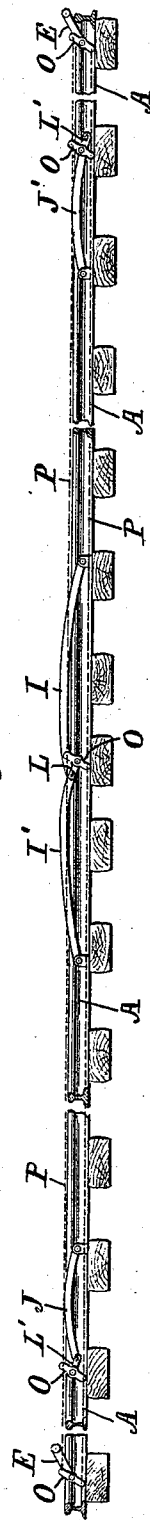


Fig. 4.

Fig. 5.

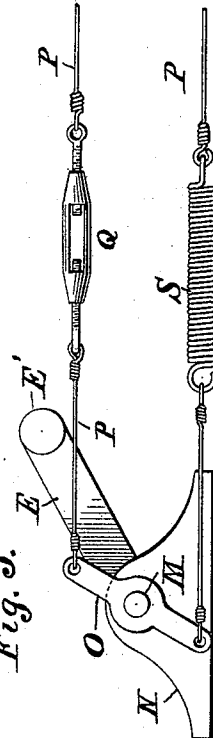
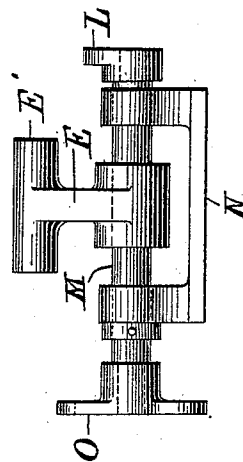


Fig. 6.



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Fig. 7.

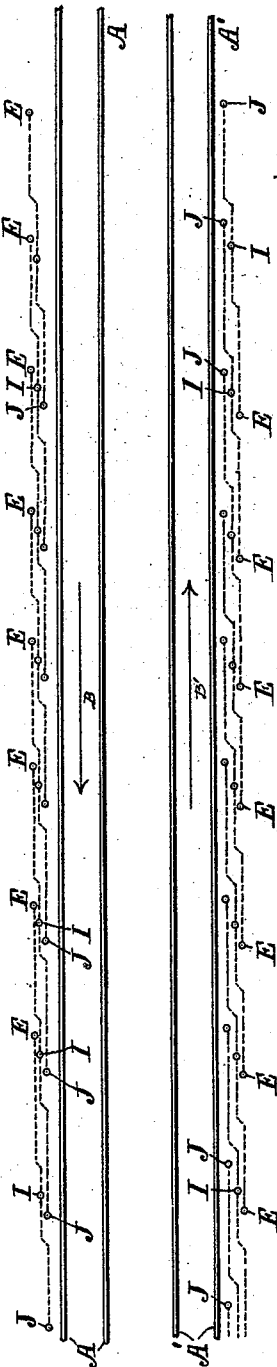
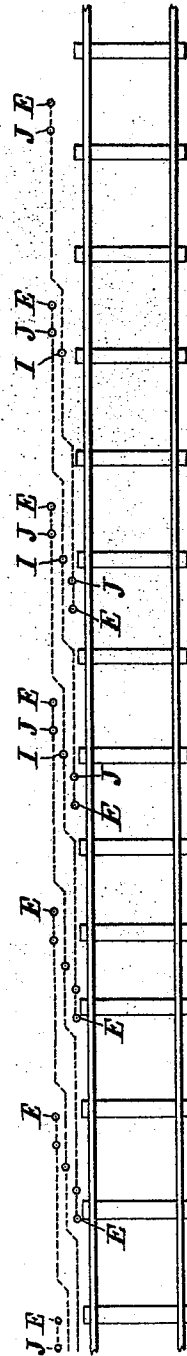


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN H. FOX, OF JERSEY CITY, NEW JERSEY.

BLOCK SYSTEM FOR AUTOMATICALLY OPERATING AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 530,937, dated December 18, 1894.

Application filed January 24, 1894. Serial No. 497,884. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. FOX, a citizen of the United States, residing at Jersey City, Hudson county, New Jersey, have invented certain new and useful Improvements in Block Systems for Automatically Actuating Air-Brakes, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The present invention relates to that class of devices in which the steam, air, or vacuum brakes upon a railway train are automatically operated by providing a brake valve lever upon the moving train and mounting a dog or arm at the side of the track to operate upon the same when required. Such dog or arm has, as described in my Patent No. 507,976, granted October 31, 1893, been heretofore set in an operative position by a lever mounted movably at the side of the track rail at the rear or first end of the block or section of track in which the train required protection. The dog when thus set by a tread lever has been held in its operative position by a lock which would be released by the subsequent passage of the train over a trip lever at the end of the safety block; a spring then operating to retract the dog as the train passes from the block. It will be observed that such a construction is only operative with trains moving in one direction, as a train moving in the opposite direction would set the dog in advance of the train, and thus cause its stoppage as it advanced. I have therefore devised the mechanism herein described for operating the dog in a suitable manner by a train moving in either direction. In my improved construction I actuate the dog positively by means of tread-levers located in suitable positions, and connected reversely with the dog, so that the depression of a primary lever may set the dog in the path of the moving brake lever, while the depression of a secondary lever retracts the dog from such position. The reverse connections of the tread levers to the dog are effected by attaching double armed cranks to the tread levers and to the dogs, and connecting suitable arms of the levers by two lines of rods P. One line of the rods transmits the motion in one direction, and the other line of rods transmits it in the opposite direction; by which arrangement the rods are used only

under tension and may thus be made very much lighter than when they are required to push as well as to pull in transmitting the motion.

My present invention includes the combination of the dog mounted movably at the side of the track, with tread levers connected reversely to such dog; and the combination with such dog, and the tread levers reversely connected thereto, of springs to compensate for expansion, and turn buckles for adjusting the parts in their required relation.

The invention also includes suitable arrangements of such dogs and tread levers to protect both ends of a single block or section, or the rear end only of a given block of double track.

It also furnishes an interlocking system of blocks adapted for use upon either single or double track railway.

These improvements will be understood by reference to the annexed drawings, in which the track and connections are broken at various points for want of room upon the drawings, as the different portions of the device would in practice be located hundreds of feet apart.

Figures 1 and 2 show devices adapted for a double track upon which the trains would normally run in a single direction only, Fig. 1 being a side elevation of a railway track with the forward end of a locomotive having a brake valve mounted thereon. Fig. 2 is a plan of the same track. Fig. 3 is a side elevation of a railway track with the device adapted for use upon single tracks where trains pass in both directions; the bearings for the rock shafts being omitted, as well as certain springs and turn buckles, on account of the smallness of the scale. Fig. 4 is an elevation of the bearing and coupling crank for the duplex tread lever shown in Fig. 3, the view in Fig. 4 being taken upon the reverse side of that shown in Fig. 1. Fig. 5 is a side view of the dog which is shown at the opposite ends of Fig. 3, with its bearing, double crank and connecting rods. Fig. 6 is an end view of the same without the connecting rods. Fig. 7 is a diagram of a double track railway provided with an interlocking safety block system of dogs and tread levers; and Fig. 8 is a diagram of a single track rail-

way provided with an interlocking safety block system of similar devices.

I will first describe the construction with reference to the double track railway shown 5 in Figs 1 and 2, in which the trains move normally in a single direction.

In the figures, A designates the track rails, upon which the engine moves in the direction of the arrow B.

10 C, C' designate bearings fixed by the side of the rail at the ends of the block or section, which block may be of any desired length, as two thousand feet or more. Rock shafts D, D' are mounted horizontally in the bearings 15 the shaft D carrying an upright arm E with a cross bar E' upon the top, such arm constituting the dog.

In Fig. 1, a brake valve F is shown mounted upon the forward end of a locomotive, with 20 brake-valve lever G extended therefrom and provided at the end with a toe H adapted to engage the dog E.

Intermediate to the shafts, the primary tread lever I is mounted at the side of the 25 rail A, one end being pivoted to a stand K and the opposite end being united by suitable connections to the dog E. A wheel R is shown pressed upon the middle of the lever, thus forcing its free end downward, and the 30 connections are so arranged as to elevate or set the dog E in the path of the brake lever G when the primary lever is thus depressed. The tread lever would in practice be made of flat bar iron set on edge, and twelve or four- 35 teen feet in length; and vertical guides would be used at one or more points to hold such flat bar from twisting. One of such guides I³ is shown embracing opposite sides of the lever near its free end where it operates upon 40 its connections to the dogs. The connections shown in the drawings consist of a crank L mounted upon a rock shaft M in bearings N at the side of the rail, and having a stud i upon the lever I fitted to a slot in the crank; 45 also of double cranks O upon such shaft and on the shafts D, D'; with two lines of rods P connecting the corresponding arms of all the double cranks.

Turn buckles Q are inserted in the rods to 50 adjust the parts in their required relation, and springs S are inserted in the rods at suitable points to compensate for the expansion and contraction of the rods due to variations of temperature. As the rods perform their 55 work under tension, the springs S are in all cases adjusted to produce the tension which is required to effect the movement of the dog and to hold it in an operative position. The secondary lever J is arranged near the forward 60 end of the block and connected with the shaft D', by a crank L' upon which the free end of the lever operates, the crank being projected in a direction opposite to the crank L, thus imparting a reverse movement to the rods P and dog E. The depression of the 65 primary lever I thus operates to elevate the secondary lever J as shown in Fig. 1. The

movement of the wheel R from one lever to the other would thus operate (by depressing the secondary lever) to turn the dog down 70 into the position indicated by dotted lines E²; and thus retract it from the path of the brake-lever. The depression of the secondary lever also operates, by the reverse connection 75 of the two levers with the rods P, to raise the primary lever above the track rail, as indicated by dotted lines I². The primary lever is thus in position to be depressed by the first passing train, which depression sets the dog 80 at the rear end of the block, and thus prevents the entrance of any other train upon such section of track. Springs S' are shown inserted in the rods P adjacent to the dog E, which permit the dog to yield if inadvertently 85 pressed by a snow plow, or other object, moving along the track, of greater width than the engine pilot; which pilot the dog is located to clear. Such springs are, however, made of sufficient strength to prevent the dog from 90 yielding when engaging the brake lever arm or a toe thereon. The springs S' also perform an additional function in softening the concussion between the dog and the brake lever arm when the latter presses against it as it 95 moves with the engine.

In a device for single track, upon which the trains would move in both directions, as shown in Fig. 3, a secondary lever J is provided near 100 each end of the block, and the primary tread lever is preferably made duplex by connecting the free ends of two bars I, I', to the same crank L, (as clearly shown in Fig. 4) and pivoting the outer ends of such bars in suitable 105 fulcrum. With such construction the bar is sloped or curved gradually upward from its fulcrum toward its connection with the crank L, and exposes such inclined surface to the passing wheel as it approaches the crank. By the use of two such bars to form the primary 110 tread-lever, the crank L may be actuated more gradually and smoothly than where a single lever is sloped from both ends toward the middle, while one end only is attached to the crank. The dogs and the various tread-levers 115 are, in Fig. 3 set in an opposite position to that exhibited in Fig. 1, as the primary tread lever is shown located above the rail A, while both the secondary levers are shown depressed, and the dogs turned downward to retract them from the path of the brake-valve 120 lever. The block is thus in readiness for the entrance of a train at either end, such train operating upon the lever I or I' when it reaches the same, thus setting the dogs E at both ends of the block, and throwing both of 125 the secondary tread-levers upward, by reason of the reverse arrangement of the cranks L and L'. Such arrangement is noticeable in the projection of the crank L at the left side of the double crank O, while the cranks L' 130 both project at the right hand side of the double cranks O with which they are connected. A reversal of the connections can also be effected with the cranks L, L' pro-

jected all in the same direction, by crossing the rods to the opposite arms of the adjacent double cranks.

It is obvious that the primary tread-lever 5 may be located at any point within the block which is to be protected, and where a single block only is used, as within a tunnel or upon a bridge, such primary lever would be located within the commencement of the block, so as 10 to set the dogs at opposite ends of the same and protect the train until it cleared the track. I have, however, in Figs. 7 and 8 shown an overlapping block system comprising a series of such mechanically operated dogs provided 15 with tread-levers, as shown in Fig. 1, and mounted at the rear ends of the successive blocks; the primary tread-lever of each block being arranged for actuation by the moving train in advance of the secondary lever upon 20 the preceding block, so that the dog at the rear end of each block is set in an operative position before the dog upon the preceding block is retracted. Such a system is adapted for double track, but where trains are ar- 25 ranged to run in both directions upon the same track, the dogs are provided with two secondary levers, as shown in Fig. 3, and mounted at the opposite ends of each block, the primary lever of each section being ar- 30 ranged for actuation by the moving train in advance of the last secondary lever of the preceding block.

The different elements of the combination are indicated merely by dots with reference 35 letters in Figs. 7 and 8, the dogs being designated by the letter E, the primary lever by the letter I, and the secondary levers by the letters J and J'.

In Fig. 7, A designates the rails of the track 40 upon which the cars move in the direction indicated by the arrow B, and A' indicates the track upon which the cars move in the opposite direction, as indicated by the arrow B'. The rods connecting the tread levers with the 45 blocks are indicated by the dotted lines P at the side of the track, such lines being bent to indicate the overlapping of the devices upon the adjacent sections; although in practice such rods would be carried upon the same 50 line. Supposing a train to enter the track A at the right hand end, it will be observed that the train would press upon the lever I in the second block before it depresses the secondary lever J of the preceding block, and that 55 such operation would be repeated as each block was entered, thus constantly setting a dog behind the train before retracting the dog upon the section in advance.

With the single track shown in Fig. 8, the 60 primary and secondary levers are arranged in a similar relation, so that the pressure of the primary lever operates to set a dog at both ends of the block before it depresses the last secondary lever of the preceding block; and 65 the dogs at opposite ends of each section are thus set in an operative position before the dogs upon the next preceding block are re-

tracted. The double armed crank O is used 70 in the drawings to illustrate a connection adapted, by the use of two rods, cords or wires, to transmit motion in opposite directions to the dog E; but if flexible cords be used it is obvious that a circular pulley would be an exact equivalent for the double armed crank, 75 and that, in fact, the opposite sides of the pulley would form arms upon which such cords would operate the same as the rods P operate upon the crank O.

It is obvious that my invention may be carried out by any form of dog which is adapted 80 to trip or engage the brake valve lever when set or held in the path of the same.

Any equivalent may be employed for the dog or tripping arm E shown herein, as the 85 dog would operate the same if constructed to slide instead of oscillating with a rock shaft, and in such case would be moved back and forth by any suitable means. It will be observed that the block system described herein is wholly mechanical in its construction, and 90 wholly automatic in its operation; as it does not employ any electrical or magnetic devices, and is not dependent upon the watchfulness or skill of any operator.

With the brake valve properly mounted 95 upon a moving train and the brake valve lever projected therefrom, it would obviously be impossible for the train to engage a suitable dog or tripping arm sustained at the side of 100 the track, without opening the brake valve and thereby bringing the brakes into operation. The train would thus be stopped without the agency of any person upon the train, and with greater certainty than could be at- 105 tained if the engineer were required to act in obedience to signals.

With the overlapping arrangement of tread levers and dogs shown in Figs. 7 and 8, it is obvious that no train would be capable of en- 110 tering a given block until any preceding train had actually passed from such block.

In applying my improvement to moving trains, I have been accustomed to mount a brake valve upon each side of the locomotive, and to project the brake valve lever 115 from each of said valves at a similar distance beyond the outer side of the track rail. The dog or tripping arm has been fixed at a corresponding distance from the rail upon the 120 outer side, and has been thus adapted to engage one of the brake valve levers when the locomotive was facing or moving in either direction. The brake valve with its lever may, however, be mounted upon any part of 125 the moving train, and the dog or tripping arm be fixed adjacent to the track rail in any corresponding position.

By the use of the double cranks and two lines of rods or wires connecting the same, I am enabled to move the dog positively in op- 130 posite directions, and am enabled to wholly dispense with any lock or latch, as is sometimes used where the dog is moved in one direction only by its connections, and is shifted

in the opposite directions by a weight or spring.

I hereby disclaim the combination, with a block of railroad, of signals located at the ends thereof, and adapted to be operated automatically and simultaneously by a train, and means located intermediate of said signals for operating the same. In my construction I do not use any signals but rely wholly upon the co-operation of the air brakes upon the train with the mechanism which I provide by the track for actuating the same.

Having thus set forth the nature of the invention, what I claim herein is—

1. A device for automatically stopping railway trains upon a given block or section of railway track, comprising dogs mounted movably in suitable bearings beside the track at opposite ends of such block, and adapted when set to engage a brake-valve lever upon a moving train, a primary tread-lever beside the track rail with connections for setting both dogs, and two secondary levers near the opposite ends of the section, with connections to the dogs adapted, by the depression of either of such levers by the passing train, to retract the dogs and elevate the primary tread-lever, substantially as herein set forth.

2. An overlapping safety block-system comprising a series of primary tread-levers mounted at the side of the rail one at the middle of each block, dogs mounted movably at the side of the track at the opposite ends of each block, and adapted when set to engage a brake-valve lever upon a moving train, with suitable connections to the primary lever for

setting such dogs by the depression of the lever, a secondary lever near each end of the block with suitable connections to both of the dogs for retracting the same by the depression of such lever, and the primary lever of each section being arranged for actuation by the moving train in advance of the last secondary lever of the preceding block, whereby the dogs at opposite ends of each section are set in an operative position before the dogs upon the next preceding block are retracted, substantially as herein set forth.

3. A device for automatically stopping railway trains upon a given block or section of railway track, comprising dogs mounted movably in suitable bearings beside the track rail at opposite ends of such block, and adapted when set to engage a brake valve lever upon a moving train, the duplex tread lever consisting of the bars I, I', fulcrumed at their outer ends and united at their inner ends by the crank L, two secondary levers near the opposite ends of the block and suitable connections from the crank L and the secondary levers to the dogs such connections being adapted by the depression of the duplex lever to set the dogs and elevate the secondary levers, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN H. FOX.

Witnesses:

L. LEE,

THOMAS S. CRANE.