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W. F. DAVIS

HAND BRAKE MECHANISM FOR RAILWAY CARS

Filed Oct. 19, 1921

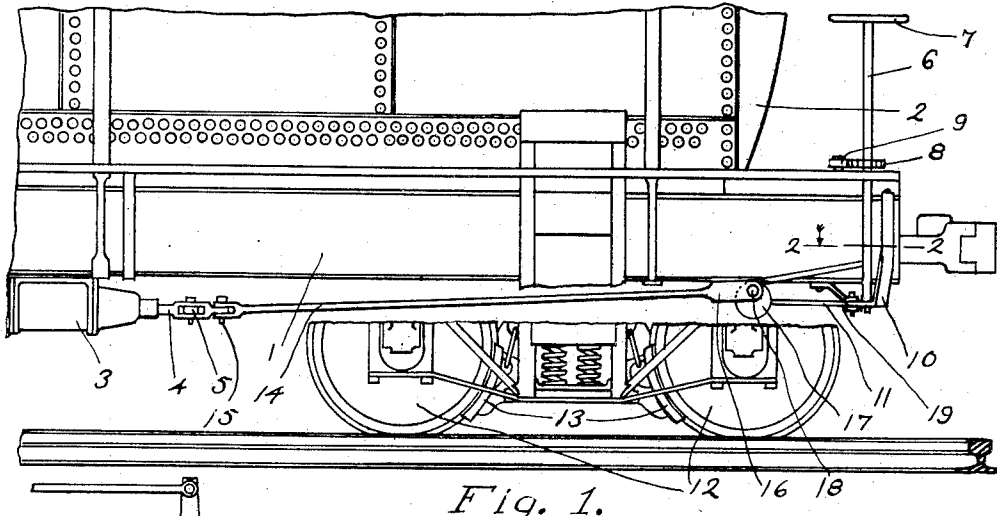


Fig. 1.

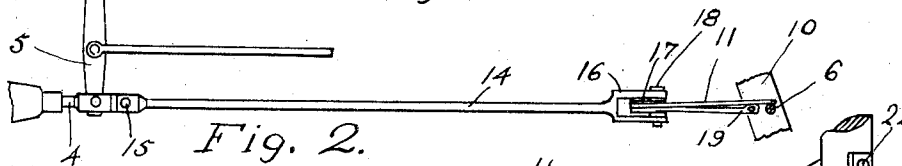


Fig. 2.

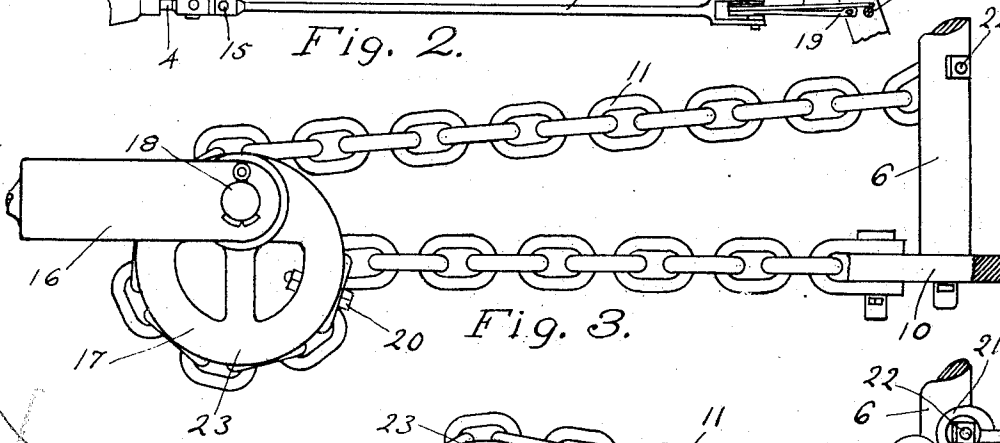


Fig. 3.

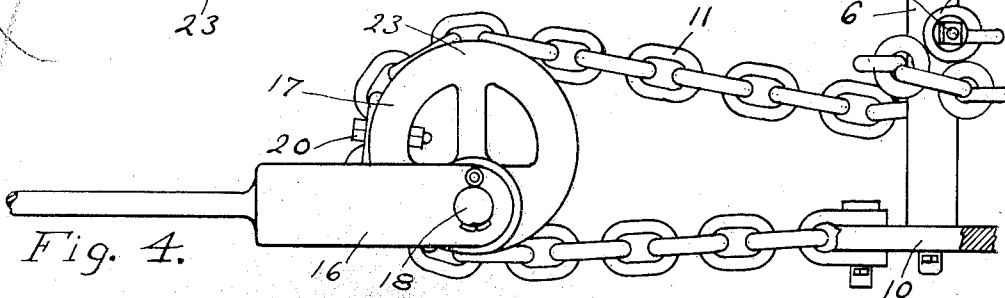


Fig. 4.

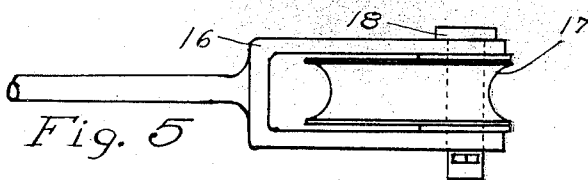


Fig. 5.

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HAND-BRAKE MECHANISM FOR RAILWAY CARS.

Application filed October 19, 1921. Serial No. 508,689.

To all whom it may concern:

Be it known that I, WILLIAM F. DAVIS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Hand-Brake Mechanism for Railway Cars, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to hand brake mechanism for railway tank cars, and more particularly to an improved mechanism for employment in the hand brake connections from the brake mast to the cylinder lever of railway car brakes. It is customary to employ a brake mast and wind a chain thereon to set the brakes, the chain usually connecting direct to a hand brake rod which in turn is connected to the cylinder push rod or the cylinder lever.

The usual force exerted on the brake chain, and likewise on the cylinder lever, with a direct connection of the chain to the brake rod is approximately twelve hundred pounds, it being usual to increase this force by applying a sheave wheel to the brake rod so that the pull should figure double that pulled direct, but it is found in practice that the usual sheave wheel increases the force only to approximately eighteen hundred pounds.

As a ten inch diameter air brake cylinder is a usual size employed on railway freight cars, and other diameter cylinders are subject to similar rules and conditions, only the ten inch diameter will be considered herein in order to save space and unnecessary description.

It has been required by the American Railway Association that the hand brake pull shall equal the force exerted by the air brake cylinder with fifty pounds of air, which equals approximately thirty nine hundred and fifty pounds, in the ten inch cylinder.

As hereinbefore stated the usual brake mast and chain employing an ordinary sheave wheel exerts in practice approximately eighteen hundred pounds, so that most railway cars are equipped with hand brakes with an efficiency of less than one half of that required by the American Railway Association.

The present invention has provided an

improved mechanism applicable to the usual brake mast chain and hand brake rod that with an ordinary pull on the hand wheel of the hand brake will exert a force on the cylinder lever equal to and in excess of that required by the American Railway Association.

With these and other objects in view, the invention consists in the features of construction, combinations and arrangements of parts hereinafter set forth and more particularly pointed out in the appended claims, the accompanying drawings illustrating a form of the improved hand brake mechanism applied to a railway car.

In the drawings:—

Fig. 1 is a fragmentary view of a railway car with certain parts broken away and other parts removed to more clearly illustrate the improved hand brake mechanism which is shown connected to the car.

Fig. 2 is a fragmentary view on line 2—2 of Fig. 1.

Fig. 3 is a view of the improved hand brake mechanism approximately in released position.

Fig. 4 is a view of the improved hand brake mechanism approximately in brakes set position.

Fig. 5 is a plan view of certain parts of the improved mechanism.

The view of a railway car shown in Fig. 1 is that of the usual railway tank car. The invention however, is applicable to all types of railway cars, and it is not desired to confine the application of the invention to any particular type of railway car.

The under frame 1, tank 2, air brake cylinder 3, push rod 4, cylinder lever 5, brake mast 6, brake hand wheel 7, ratchet wheel 8, ratchet pawl 9, brake mast support 10, chain 11, wheels 12 and brake shoes 13 are all of common and well known construction.

The hand brake rod 14 is attached to the push rod 4 by the pin 15 in the usual manner, while the opposite end of the rod is provided with the elongated bifurcated jaw 16 in which the eccentric sheave wheel 17 is revolvably mounted on the pin 18.

The dead end 19 of the chain 11 as shown is secured to the brake mast support as is usual, but it is not important to the invention what the end 19 of the chain is connected to so long as it is anchored against

movement in a direction longitudinally of the underframe 1, it being common practice to employ other means of anchoring the dead end of the chain.

5 The chain 11 is attached to the sheave wheel 17 by the bolt 20 and passes around the sheave and the live end 21 of the chain is connected to the brake mast 6 by the bolt 22 in the usual manner, the exact manner of
10 connecting the live end of the chain to the brake mast being unimportant to the spirit of the invention.

The improved mechanism is illustrated in approximately released position in Fig. 3
15 and in approximately brakes set position in Fig. 4, it being understood that no exact operative position can be illustrated owing to the variation of adjustment and wear of the brake parts of the usual railway cars,
20 particularly the wear of the brake shoes 13 which are renewed frequently owing to rapid wear in service.

It is common practice and also a requirement of the American Railway Association
25 that the brakes be so adjusted that the cylinder push rod 4 will have a movement of not less than six inches and not more than eight inches from full release to full brakes set
30 position, it is also customary and required that an extreme movement of twelve inches be provided for.

The diameter and the amount of eccentricity of the eccentric sheave wheel 17 as the throw or distance from the center of
35 the sheave wheel to the center of the pin 18 can be varied to meet conditions by the ordinary mechanic so that the full side 23 of the sheave wheel will stand approximately
40 as shown in Fig. 4 when the brakes are set and approximately as shown in Fig. 3 when the brakes are released, the views representing approximately the proportions and positions of the mechanism as applied
45 to a railway car equipped with a ten inch air cylinder.

Whether the brakes be adjusted to set with six inches or eight inches movement
50 of the push rod, there will be but slight variation in the position shown in Fig. 4 when the brakes are set, and it is obvious that the brake mast 6 may be turned by the
55 hand wheel 7 and more chain wound upon the mast and the brake rod 14 pulled so as to move the push rod 4 to the extreme twelve inches of movement, but the force exerted
60 on the rod will decrease as the chain is pulled beyond the set position shown in Fig. 4.

From the foregoing it will be understood
65 that the improved mechanism is so applied that the maximum pull on the brake rod 14 is attained at six to eight inches movement of the rod and that should the brakes be temporarily out of adjustment and a movement of twelve inches be required to set

the brakes, the improved mechanism is still operative but to a decreased degree of tension and pull on the rod 14, it will also be understood that the rules for maintaining
70 the brakes of railway cars in proper adjustment are very strict and that twelve inches of movement of the brake rod 14 may never be required to set the brakes.

It is obvious that the foregoing is an illustration of present conditions on American
75 railways and that the invention is not confined to the measurements, movements and conditions as stated.

The slack in railway car brakes is commonly known to mean that movement of the
80 brake rod 4 from release position to that of the position which will press the brake shoes 13 against the wheels 12 and the movement of the hand brake rod 14 as shown is identical with that of the push rod.
85

In operation the improved hand brake is set in the usual manner by turning the hand wheel 7 and winding the chain 11 on the
90 brake mast 6, pulling the eccentric sheave wheel 17 from approximately the position shown in Fig. 3 to approximately that of Fig. 4 and it will be noted that as the chain is wound the brake rod 14 will be advanced comparatively very rapidly in the beginning
95 of the winding and that the force exerted on the rod will be comparatively small owing to the pull of the chain being on the small side of the eccentric sheave wheel.

During the early part of the winding of
100 the chain 11 the slack of the brakes is being taken up and no great force is required, but as the eccentric sheave wheel approaches approximately the position shown in Fig. 4 the slack is taken up and the shoes 13 are
105 bearing on the wheels 12, the full side 23 of the eccentric sheave wheel is now approximately at a right angle to the brake rod 14 and the action is equivalent to that of a lever reaching from the chain 11 at 23 through the center of the pin 18 to the chain
110 11 on the opposite or small side of the sheave wheel.

It is understood that in common practice
115 as the brakes are set by the hand wheel 7 the ratchet pawl 9 is held in contact with the ratchet wheel 8 and the winding of the chain 11 held in wound position until it is desired to release the brakes.

When it is desired to release the brakes
120 with the improved mechanism applied it is only necessary to release the pawl 9 and the eccentric sheave wheel 17 will immediately turn to full release position, this being an important advantage of the improved
125 mechanism as the concentric sheave wheel applied to hand brakes does not release readily.

The eccentric sheave 17 is, in its action, a reversible lever. The end of the power
130 arm of this lever is the point at which the

live branch of the chain engages the sheave, and the end of the load arm the point at which the anchored branch engages the sheave. The pivot 18 is at all times the fulcrum of the lever. The parts are so proportioned and related that in release position the power arm of the lever is shorter than the load arm, and hence, during the initial movement in setting the brake, the power applied is but slight and the movement of the load is greater than would result from a direct application of force thereto. As the movement of the lever proceeds its power arm is lengthened and its load arm shortened, with a corresponding decrease in travel of the load and increase of effective force applied.

The primary object of attaching the chain to the sheave is to prevent slippage, but by positioning the point of attachment on an intermediate radius of the sheave the rate of travel during the first stages of the setting action is lessened but is ample, while the size of the sheave may be sufficient to insure the desired ultimate powerful leverage.

The word chain is used in a generic sense to include any flexible cable. Preferably, though not necessarily, the chain is continuous from brake staff to fixed anchorage. When there is an attachment of the chain to the sheave the connection between the two branches is immaterial.

While the hand brake mechanism is shown as connected with the push rod of the air brake mechanism, this is not important, it being necessary only that there be a connection with the brake lever. The connection between the sheave and the brake lever is shown as a rod, according to common practice, but for the purpose of this invention it is important that this connection be capable of transmitting draft.

When the improved hand brake mechanism is applied to a railway car the hand brakes are set and released in the same manner as the usual railway hand brake applying a brake mast and hand wheel and the brakemen applying and releasing the brake can only distinguish the difference in the distance required to stop the car.

The improved hand brake mechanism was attached to a car of approximately forty four thousand pounds light weight and equipped with a ten inch air brake cylinder and the car speeded to eighteen miles per hour, and stopped by the hand brake in approximately sixty feet travel from the point where the speedometer was read.

Under ordinary test the brakes of the above referred to application were set by the hand wheel 7 in the usual manner and a force of more than five thousand pounds

exerted on the brake rod 14, which is in excess of the thirty nine hundred and fifty pounds minimum required by the American Railway Association.

The improved hand brake mechanism is of particular importance for application to the various types of freight cars on American railways, as the present hand brake force must be increased in most cases more than one hundred per cent above the heretofore attainable force.

What I claim as new and desire to secure by Letters Patent, is:—

1. In hand brake mechanism for railway cars, a railway car, a brake mast and a brake cylinder lever mounted on said car, a hand brake rod with one end thereof connected by communicating connections to said lever, the opposite end of said hand brake rod provided with an elongated bifurcated jaw, a pin passing through said jaw, an eccentric sheave wheel revolvably mounted on said pin, a chain with one end thereof anchored to said car, said chain reaching to said sheave wheel and means on the periphery of said wheel arranged at substantially 90° from said pin for connecting said chain to said sheave wheel, said chain then passing around said sheave wheel and extending to said brake mast, and said chain secured to said brake mast.

2. In a brake mechanism for railway cars, the combination with the usual brake chain anchored at one end and fixed at the other end to a winding shaft, and the brake rod by which the force applied to the chain is transmitted, of an eccentric sheave journaled in the brake rod and having a grooved periphery receiving an intermediate portion of the chain, and a shackle connecting the intermediate portion of the chain to the grooved periphery of the sheave.

3. In a brake mechanism for railway cars, the combination of a brake chain formed into a bight with one end anchored and the other end fixed to a winding shaft, and a brake rod by which the force applied to the chain is transmitted, with a grooved sheave receiving the bight of the chain and eccentrically journaled in the brake rod and a shackle connecting the bight of the chain to the sheave.

4. In a brake mechanism for railway cars, the combination with the brake rod having a jaw, and the brake chain passing through the jaw and having one end anchored and the other end fixed to a winding shaft, with a grooved eccentric sheave journaled in the jaw and a shackle securing the chain to the sheave between the points of maximum and minimum eccentricity of said sheave.

WILLIAM F. DAVIS.