

Oct. 23, 1923.

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L. N. HAMPTON

BRAKE FOR ROLLING LADDERS

Filed Nov. 26, 1920

2 Sheets-Sheet 1

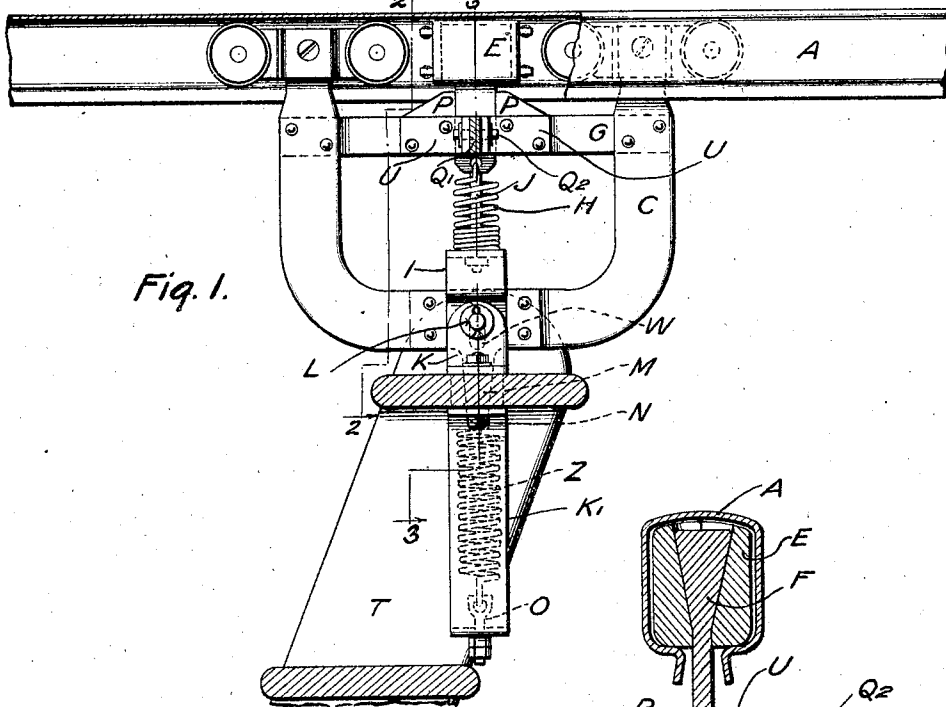


Fig. 1.

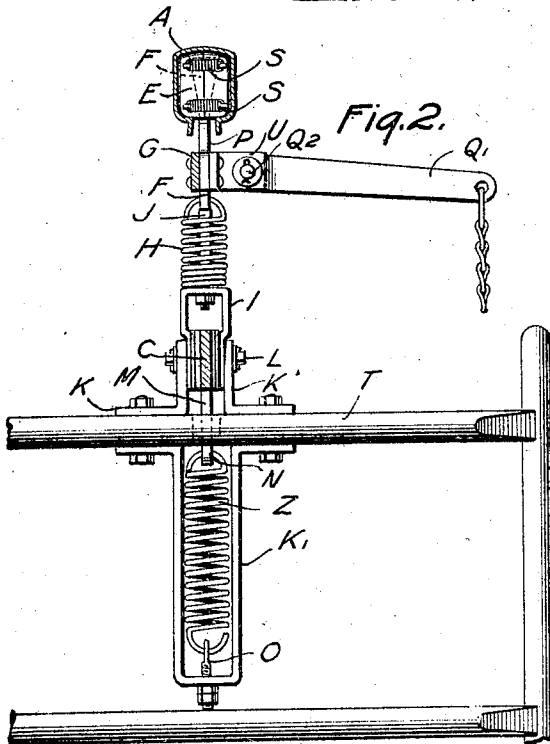


Fig. 2.

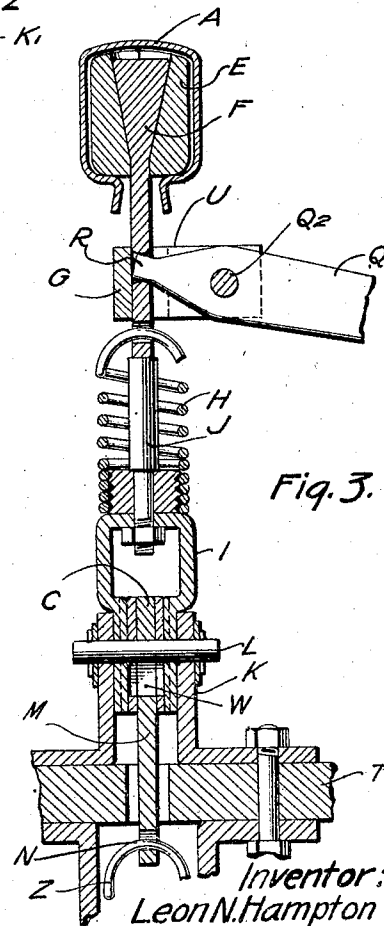


Fig. 3.

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2 Sheets-Sheet 2

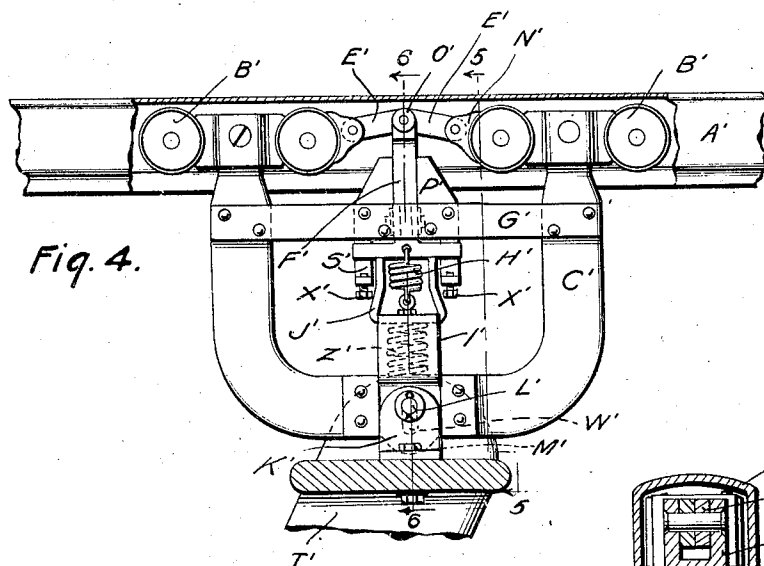


Fig. 4.

Fig. 5.

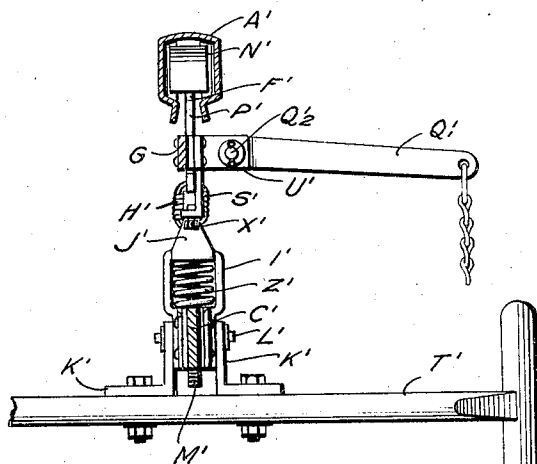
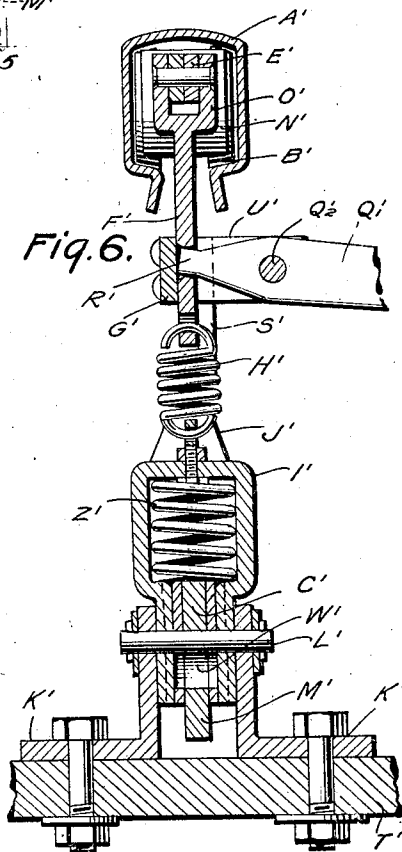


Fig. 6.



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UNITED STATES PATENT OFFICE.

LEON N. HAMPTON, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BRAKE FOR ROLLING LADDERS.

Application filed November 26, 1920. Serial No. 428,464.

To all whom it may concern:

Be it known that I, LEON N. HAMPTON, a citizen of the United States, residing at New York, in the county of Bronx, State of New York, have invented certain new and useful Improvements in Brakes for Rolling Ladders, of which the following is a full, clear, concise, and exact description.

This invention relates to improvements in rolling ladders, and more particularly, in that class of rolling ladders which are supported on an overhead track for use in telephone exchanges, stores and the like where it is necessary to have ready access to machine parts or shelves normally out of reach.

The primary object of the invention is to provide a ladder with a brake which is automatically applied by the weight of the person using the ladder and similarly released upon the removal of the weight.

A further object is to provide a means, operating independently of the movement of the ladder, whereby the brake can be released while the ladder is occupied. Furthermore, this desirable feature is brought about in such a way, that, by using a minimum effort, the brake may be released so that the ladder will be free to be rolled from place to place as desired.

More specifically, the invention consists in the combination with a track, and a truck movable on the track of a ladder depending therefrom, cooperating with a locking member or brake which serves to secure the truck against movement on the track, and which is actuated by a limited downward movement of the ladder, the latter having a yielding connection with the braking member. The braking member is also normally held in its inoperative or released position by a spring or other means to counter-balance the weight of the ladder when it is not in use.

To these and other ends the invention consists in certain combinations of parts all as will be more fully described hereinafter, the novel features being pointed out in the claims appearing at the end of this specification.

In the drawings:

Fig. 1 is a view showing in side elevation and partly in section the upper portion of a ladder structure illustrating a preferred embodiment of my invention;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical sectional view along the line 3—3 of Fig. 1;

Fig. 4 is a side elevation partly in section illustrating a modified form of my invention.

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged vertical sectional view taken on the line 6—6 of Fig. 4.

Similar reference letters in the several figures indicate similar parts.

In carrying out my present invention, a ladder T, provided with flat steps or rungs as illustrated in Fig. 1 which is a preferred embodiment of my invention, is suspended from an overhead longitudinally slotted tubular track A through the medium of a depending yoke or truck member C so as to have a limited vertical movement with respect to the same. This movement is obtained by reason of a slot and pin connection in the mechanism, the slot W being located in the horizontal section of the depending yoke member C while the pin L, which works within the limits defined by the slot W, is firmly seated across the two brackets K which in their turn are likewise rigidly attached to the ladder T on its upper step. In order that this relative motion of the ladder T to the truck C may be restricted, according to the requirements of the present invention, a restoring tension spring Z is attached to the ladder T and the depending truck C, the connection being obtained in the case of the ladder, by means of a U-shaped bracket K', which contains the spring Z fastened at O and which is located on the under side of the top step of the ladder T in alignment with the brackets K holding the pin L, and in the case of the truck C it is obtained at N by an elongated spur or projection M formed directly beneath and integral with the slotted portion of the truck C and passing through an aperture in the ladder step between the U-shaped bracket's securing plates K'. This spring Z using the truck C as its fixed support, exerts sufficient pull when the ladder T is unoccupied to raise the ladder and the pin L rigidly seated thereon, until the latter reaches the upper limit of its confining slot W; but it does not in the reverse instance,

exert sufficient pull for the same purpose when the ladder T is occupied, but is in this case overcome by the force resulting from the weight on the ladder, so that the ladder is lowered until the pin L reaches the opposite or lower limit of the said slot W. It is this arrangement which fundamentally controls the operation and release of the braking mechanism which will now be described.

The pin L which connects the ladder T and the depending truck C, so as to allow vertical play of one in respect to the other, also serves to rigidly hold to the ladder brackets K in which it is seated, a cap piece I constructed of a U-shaped angle iron, and provided with shoulders on its sides which bear against the vertical legs of the ladder brackets K. Fastened to the top of this cap piece I is a second tension spring H which for convenience will be called the braking spring to distinguish it from the restoring spring Z described in the last paragraph. The second member to which this braking spring is attached and with which the ladder cooperates is an actuating member F for the brake shoes or locking member E, the actuating member comprising a bar or rod portion which is guided for vertical motion on the cross bar G by means of plates P and a wedge shaped head, the inclined sides of which bear against the oppositely inclined inner surfaces of a pair of braking shoes E. The shoes E are resiliently connected by means of a pair of springs S between each set of opposing ends so that there may be constant engagement between the inclined surfaces of the shoes E and those of the actuating member F, to the end that the outer friction surfaces of the brake shoes E will be withdrawn from engagement with the track surface by the action of the springs S when no pressure is being applied from within by the actuating member F. Assuming that the ladder T is occupied and the pin L is at its lower limit in the slot W, sufficient pressure is being applied to the actuating member F through the medium of the braking spring H to force the shoes E into engagement with the inner surface of the track A and an effective braking action is thus brought about. Having covered the automatic application of the brake when the ladder is in an occupied condition, the operation of the elements which enter into its automatic release when the ladder is not occupied will next be considered.

The element which plays an important part in automatically releasing the braking shoes E when the restoring spring Z has moved the ladder upward and brought the pin L to the upper limit of the slot W, is a releasing member J which is secured in the upper face of the cap piece I, and

which has sufficient cross sectional diameter in its upper portion to provide an appreciable bearing surface to engage and abut against the actuating member F, relieving the pressure on the inner faces of the inclined surfaces of its head so that the shoes E, having their inner surfaces simultaneously relieved of pressure can be drawn together and out of engagement with the track A by the action of the small springs S which are specifically provided for this purpose.

In the manual release of the brake, which is a feature that enables a person using the ladder to release the brake in spite of the fact that his own weight tends to apply it, a lever Q₁ pivoted at Q₂ on the brackets U is employed to pry the actuating member F upward by getting a purchase at R, to relieve the lateral pressure on its inclined faces. The ladder remains stationary, moving neither up nor down, but holding the position it is naturally in when occupied, that is, the pin L is at its lower limit in the slot W. As the actuating member F is pried upwards, the braking spring H elongates and a separation occurs between the member F and the member J which normally functions in automatically releasing the brake, so that the desired result is obtained without effecting or being affected by the vertical position of the ladder. Inasmuch as a separation occurs between the actuating member F and the releasing member J of the mechanism, when the manual release is being employed, it is evident that the force required to effect this release, disregarding the factor of mechanical advantage gained by the lever Q, need only be sufficient to overcome the tension of the spring H, which will be for all practical working conditions, a definite, fixed force in a given ladder.

Fig. 5 shows a modification of the invention the mechanical elements corresponding to those in Fig. 1 being referred to by similar letters. In this case the slot W' and pin L' connection is similar to that mentioned in the preferred embodiment; but several of the elements employed in obtaining the result are changed. For example, instead of using as a restoring or counterbalancing means, a tension spring located under the top step of the ladder, as is done in the first instance, a compression spring Z' which fits snugly within the cap piece or housing I' is employed. When the ladder T' moves downward as the result of a weight placed upon it the cap piece I' compresses the spring Z' against the depending yoke or truck C', which has no motion in a vertical plane, and thus stores up energy in the compressed spring Z' sufficient to restore the ladder to its elevated position when the weight is again removed. Thus an efficient and compact means is provided

for controlling the motion of the pin L' in its elongated slot W'.

The means employed in automatically releasing the brake upon the upward motion of the unoccupied ladder consists in this instance, of two upturned ears or angle irons J', rigidly attached to the top of the cap piece I', and which abut against a brake actuating member F', provided with a horizontal section with which the ears are adapted to cooperate.

The braking mechanism is operated by the actuating member F', which receives a tension from a braking spring H', after a manner similar to that disclosed in Fig. 1. The shoes N' of the mechanism in this case, however, are not applied directly to the track surface, but to the wheels of the roller carriages B' which support the depending truck, each of two shoes cooperating with a wheel or roller on each carriage. These braking shoes N', which are provided with crescent shaped friction surfaces which approximate the periphery of the rollers in respect to their axes of curvature, are pivotally connected to two toggle levers E' which are pivotally connected at O to the vertical portion of the brake actuating member F'. A tendency for the brakes to jam and stick must in this instance be guarded against, for should the toggle levers approach a horizontal position, this condition would be the likely result. Accordingly, two angle bars S', provided with set screws X' on their horizontal faces, are rigidly attached to a cross bar G' on the depending yoke C', so that the range of movement within which the brake actuating member F' is free to operate can be determined according to the peculiarities of the individual case.

It will readily be seen from the operation of these two devices that in both cases the braking action is constant, since the counterbalancing springs namely the tension spring Z in Fig. 2 and the compression spring Z' in Fig. 6 are so adjusted that the weight of a person is sufficient to make the pin L travel the length of the slot W in the member C. Since this is the case, the power required to release the brake while the ladder is occupied need be only sufficient to overcome the tension of the springs H or H'. This arrangement, it will be seen is not only highly efficient but insures ease of operation.

It is also obvious that minor changes may be made in the combination or arrangement of parts without departing from the spirit of my invention as set forth in the appended claims.

What is claimed is:

1. In a device of the class described a track, a truck movable thereon, a ladder supported for movement on the truck, a

braking member movable into engagement with the track by a movement of the ladder and means for releasing the braking member independently of the movement of the ladder.

2. In a device of the class described a track, a truck movable thereon, a ladder depending from the truck and having a linear movement relatively thereto, a locking member and means for releasing said locking member, said means operating independently of the movement of the ladder.

3. The combination of an overhead track, a truck movable thereon, of a ladder depending from the truck and having a linear movement relatively thereto, a member serving to secure the ladder against movement while the ladder is weighted, and means for releasing the member while the ladder is weighted, said means operating independently of the movement of the ladder.

4. The combination with an overhead track, of a truck movable thereon, a ladder depending from said truck and having a linear movement relatively thereto, a locking member movable into and out of engagement with the track, an element serving to force said member into engagement with the track and means for applying a fixed tension to said element.

5. The combination with an overhead track, of a truck movable thereon, a ladder depending from said truck and having a limited movement thereon, a brake applied and released by the movement of the ladder on the truck and a brake release operating independently of the movement of the ladder.

6. The combination with an overhead track, of a truck having a linear movement thereon, a ladder movable relatively to the truck, a locking mechanism and a releasing device therefor operating independently of the movement of the ladder.

7. The combination with an overhead track, a truck movable thereon, and a braking member for securing the truck against movement, of a ladder suspended from the truck and having a limited vertical movement relatively thereto, means operating to yieldingly support the ladder in its elevated position on the truck, and a yielding connection between the ladder and braking member for operating the latter upon the downward movement of the ladder.

8. The combination with an overhead track, a truck movable thereon, and a braking member for securing the truck against movement, of a ladder suspended from the truck and having a limited vertical movement relatively thereto, means operating to yieldingly support the ladder in its elevated position on the truck, and a releasing member on the ladder arranged to engage the braking member to move it into its inoper-

ative position when the ladder is restored to its normal position.

9. The combination with an overhead tubular track, a truck having spaced carriages movable in the track, brake shoes located between the carriages and an actuating member for moving them into engagement with the track and having a limited downward movement, of a ladder suspended from the truck having a limited vertical movement thereon, a spring attached to the truck and ladder for moving the latter upwardly, a releasing member carried by the ladder and engaging said actuating member to movably hold it in an inoperative position, and a spring attached to the ladder and said actuating member for moving it upon the downward movement of the ladder.

10. The combination with a tubular track having a longitudinal slot in its lower side, a truck movable in the track comprising a yoke depending through the slot, having a downwardly extending projection, of a ladder having its top step provided with an aperture receiving said projection, a bracket beneath said step and a spring attached to the latter and to said projection serving to counterbalance the weight of the ladder, brackets above said step embracing the yoke and having a slot and pin connection therewith and a cap piece extending upwardly from said brackets, brake shoes within the track, a wedge member for separating them having a depending portion guided on the yoke, a spring connecting the wedge member with the cap piece and a part on the latter positioned to move the wedge member upwardly and hold it in an inoperative position when the ladder is elevated.

11. The combination with an overhead track, a truck movable thereon having a depending yoke portion, of a ladder supported for limited vertical movement on the truck a yielding connection between the ladder and the truck serving to counterbalance the weight of the ladder, a braking member movable into and out of engagement with the track, an actuating element guided on the yoke for vertical movement and operating the braking member and a yielding connection between said actuating element and the ladder serving to operate said element upon the downward movement of the ladder on the truck, a pin connected to the ladder and engaging said actuating element to move it into its inoperative position upon the upward movement of the ladder on the truck, a bracket on said truck and a lever bar pivoted on the bracket, and engaging said member for releasing it.

12. The combination with an overhead tubular track having a longitudinal slot in its lower side, spaced roller carriers movable in the track, and a truck supported by said roller carriers, a yoke portion depending

through the slot and a cross bar on said yoke portion, of a ladder supported for limited movement on the yoke, means co-operating with the yoke and the ladder serving to hold the ladder in its elevated position, separable braking shoes movable into and out of engagement with the track between said roller carriers, a member guided on the cross bar serving to separate the shoes, a yielding connection between the member and the ladder and a pin cooperating with the member to move it into its inoperative position, a bracket on the cross bar, and a lever pivoted on the bracket.

13. The combination with a tubular track having a longitudinal slot in its lower side, roller carriers movable in said track, a truck attached to the roller carriers, a yoke portion for the truck depending through the slot, of a ladder depending from the yoke and having a movement thereon and a yielding connection between the ladder and the yoke serving to hold the ladder in its uppermost position on the yoke, braking shoes yielding in respect to each other movable into and out of engagement with the track, a member guided on the yoke and cooperating with said shoes, a yielding attachment between said member and the ladder allowing the member to be moved downward when the ladder is moved downward and a pin attached to the ladder to force the member into position to release the brake shoes when the ladder moves upward.

14. The combination with an overhead track, a truck movable thereon, of a ladder depending from said truck having a limited movement relatively thereto, a pair of brake shoes cooperating with the track, a resilient connection holding said brake shoes in an inoperative position and an actuating member for separating said brake shoes having a depending end portion, a yielding connection between the ladder and said depending portion serving to move it in one direction to operate the brake shoes when the ladder moves downward and a pin attached to the ladder to move the actuating member into its inoperative position when the ladder moves to its elevated position.

15. A ladder, a brake for said ladder, applied by a vertical movement of said ladder, and means for releasing said brake independently of the movement of the ladder.

16. The combination with a track, of a truck movable thereon, a ladder movable relatively to the track, a braking mechanism applied by a movement of the ladder and a releasing device therefor operating independently of the movement of the ladder.

In witness whereof, I hereunto subscribe my name this 22nd day of November A. D., 1920.

LEON N. HAMPTON.