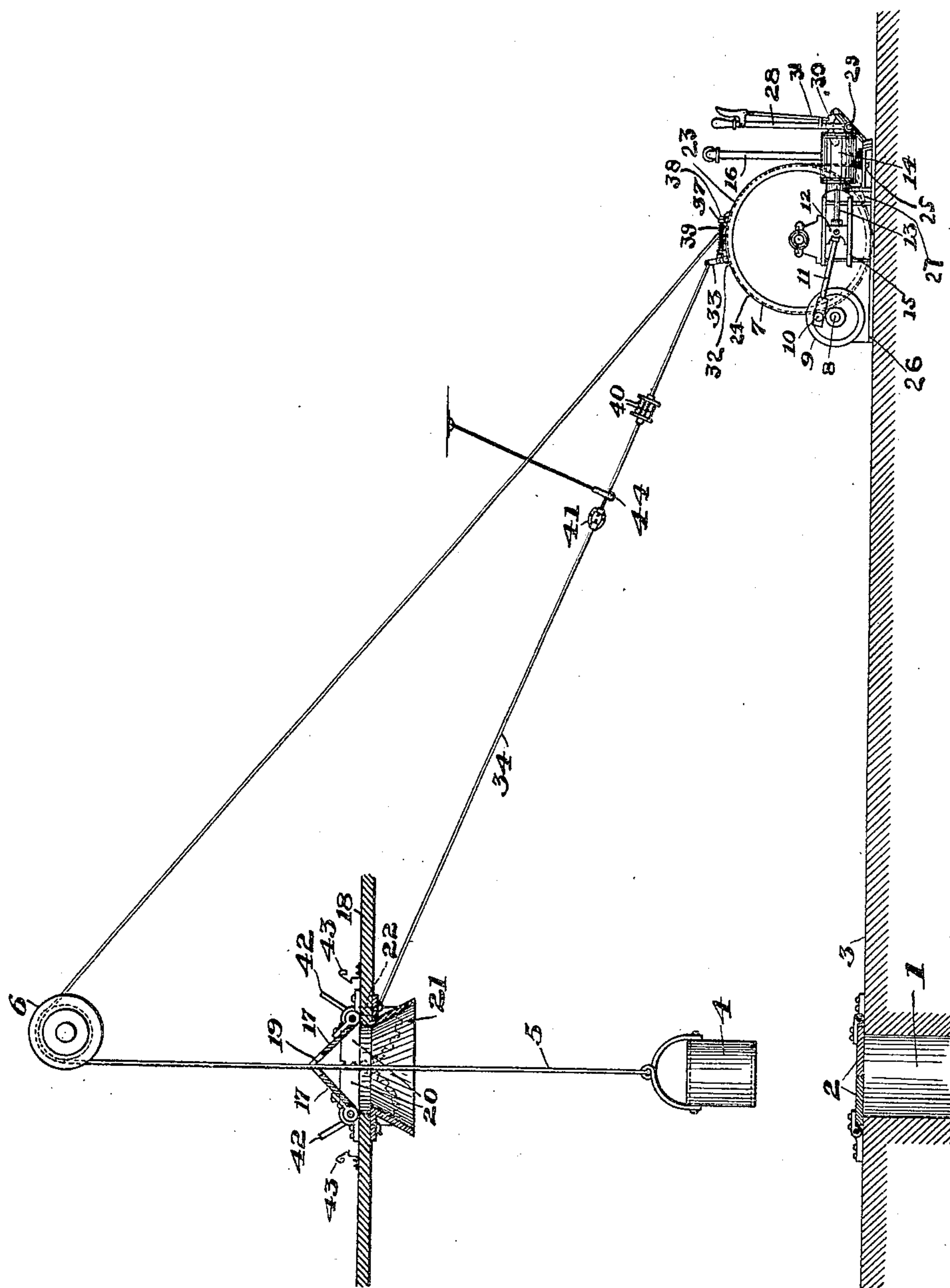


No. 800,904.

PATENTED OCT. 3, 1905.

W. COOPER.
SAFETY DEVICE FOR HOISTING MECHANISMS.

APPLICATION FILED JAN. 9, 1905.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM COOPER, OF DENVER, COLORADO.

SAFETY DEVICE FOR HOISTING MECHANISMS.

No. 800,904.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed January 9, 1905. Serial No. 240,144.

To all whom it may concern:

Be it known that I, WILLIAM COOPER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented or discovered new and useful Improvements in Safety Devices for Hoisting Mechanisms, of which the following is a specification.

In the accompanying drawing the figure is a side elevation of my improved safety mechanism applied to a mine-shaft, the shaft and safety-doors being shown in vertical section.

My present invention, generally speaking, consists in certain new and useful improvements in automatic safety devices for hoisting mechanism. A frequent accident in the use of hoisting machinery results from loss of control and failure to stop the bucket or other receptacle at the desired point. In such case the bucket is usually drawn rapidly up into the cable-sheave and wrecked, precipitating its contents down the shaft or scattering them over the shaft-house. Many lives have been lost and much valuable property destroyed by such accidents.

My invention more particularly consists of means for automatically and instantaneously stopping the ascension of the bucket when it reaches a predetermined point by its interception of means for applying a brake to the hoisting mechanism placed in its path. Thus when control is lost over the bucket and it ascends beyond the desired point above the shaft-mouth at a predetermined height it engages pivoted means extending over its path of movement, which are swung to one side and by means of connecting mechanism serve to automatically and instantaneously apply a brake to the hoisting machinery.

The following is a detailed description of the accompanying drawing, which is intended to merely illustrate the principles of my invention.

1 represents the mouth of a mining-shaft fitted with doors or other covering 2 2, said doors being preferably arranged to drop automatically into their closed position after the bucket passes through the same.

3 is the floor of the shaft-house.

4 is the hoisting receptacle, shown in this case as a bucket; but it will be understood that any form of hoisting-receptacle may be substituted therefor.

5 is the cable attached to bucket 4 and running up over sheave 6, journaled to the per-

manent structure, such as the gallows-frame, (not shown,) to the winding-drum 7 of the hoisting mechanism. I have shown the winding mechanism for the sake of illustration to be an indirect or second motion hoist where- in the cable-drum is mounted on a shaft operatively connected with main or driving shaft; but it will be understood that a first-motion hoist or one of any other design may be substituted without altering my invention. The hoisting mechanism, as shown, consists of cable-drum 7, geared or otherwise operatively connected in a manner not shown with the main driving-shaft 8, which is in turn provided with crank-disk 9 and wrist-pin 10. To wrist-pin 10 is attached connecting-rod 11, extending to cross-head 12 of the piston-rod 13, which is attached to the piston (not shown) working in cylinder 14.

15 15 are the slides for cross-head 12, and 16 is the steam-line running to the cylinder 14.

17 17 are swinging members or doors pivoted to a fixed framework or gallows-frame 18 at a predetermined distance above the shaft-mouth. Said doors are so located and arranged as to preferably assume the slanting positions shown in the drawing when closed and to lie directly in the path of the ascending bucket below the sheave. They are preferably cut away at their abutting edges, as at 19, to permit the passage of the cable and the hand and arm of an occupant of the bucket. It is apparent that the passage of the bucket through said doors would throw the same open. 20 20 are segmental gears rigidly attached to said doors concentric therewith, one of said gears being located at each side of a door, the opposing gears on the doors intermeshing, thus insuring a uniform movement in both doors.

21 is a guide preferably swung from the gallows-frame 18 and of truncated-cone shape, thus directing the rising bucket into regular contact with the doors 17 17. 22 is a crank or lever rigidly attached to one of said doors at its pivot-line and so located as to preferably turn inwardly when the doors are flung open.

23 and 24 represent a bisected band-brake adapted to engage a braking-surface on the cable-drum 7, said braking-surface not being shown in the drawing. 23 is provided with a fixed point 25 where it is attached to the engine-frame 26 of the hoisting mechanism. The brake 24 is attached at one end by means of

strap 27 to hand-lever 28, pivoted at point 29 to the engine bed-plate 26. Said lever 28 is provided with the usual sector 30 and spring pawl device 31.

5 32 is a lug attached to the free end of brake 24, to which is pivoted a lever 33, whose upper extremity is pivoted to connecting-rod 34, which is in turn pivoted at its other extremity to crank 22 of door 17.

10 35 is a lever pivotally connected to lever 33 intermediate to the ends of said last-mentioned lever and at its other end pivoted to lug 36, attached to the free end of brake 23. Thus it will be seen that when the parts are properly assembled the opening of the doors 17 17 by the runaway bucket will draw the connecting-rod 34 toward the left, and thus draw together the brakes 23 and 24 and apply them to the cable-drum 7 with great force.

20 37 37 are flanges on lugs 32 and 36, which flanges are pierced for the bolts 38, by means of which the brakes are prevented from separating more than a predetermined distance at their adjacent ends. But one of said bolts 38 is shown in the drawing on account of their location; but I prefer to provide a parallel pair of the same, thus better maintaining the brakes in perfect alinement with the braking-surface on the drum. By means of said bolts 38 both 30 of the brakes may be tightened and set by means of the hand-lever 28, which hand-lever device forms the fixed point of brake 34 when my emergency-brake is in use.

39 is a coiled spring surrounding each bolt 35 38 and bearing against the flanges 37 37, thus maintaining the brakes in their normally separated position and preventing their dragging on the cable-drum when not in use.

40 It is evident that should control be lost over the hoisting mechanism and the bucket 4 be rapidly drawn up into doors 17 17 the same would be thrown open, thus immediately and automatically applying a powerful brake to the hoisting mechanism and preventing the 45 wrecking of the bucket in the sheave 6.

I prefer to form the rod 34 in sections, which are connected by means of coiled springs 40 40, thus at all times maintaining a tension on the mechanism and insuring its prompt and 50 flexible action.

41 is a turnbuckle intermediate of connecting-rod 34, thus enabling the length of the rod to be adjusted to a nicety and also permitting the engineer to loosen the brakes after they 55 have been set by the above-described mechanism.

42 42 are arms rigidly attached to doors 17 17 at such an angle that when said doors are thrown open said arms come into engagement 60 with spring-catches 43 43 on the gallows-frame, thus holding said doors in their open position until released by hand or other convenient means. (Not shown.) Thus when the bucket operates the doors 17 17 as above described the brake would be set on the hoisting

mechanism and remain set until the doors were released from the spring-catches and closed, or until the engineer by turning turnbuckle 41 released the tension on the connecting-rod and allowed the springs 39 39 to force the 70 brakes 23 and 24 away from the braking-surface on the cable-drum 7.

44 is a pulley preferably suspended from some fixed point, so that connecting-rod 34 is supported intermediate of its ends. 75

Although I have illustrated my braking mechanism applied to the cable-drum, it is evident that the operating mechanism located above the shaft-mouth may be coupled up 80 equally well to any form of braking mechanism applied to the hoisting mechanism which may be desirable or convenient.

I have shown my swinging members or doors connected in pairs by segmental gears, which arrangement I find preferable; but any other 85 form of connection, if any at all, may be substituted therefor. I find that my twin doors geared together and provided with a guide, as shown, form the most desirable construction, especially where a bucket is used for a hoisting- 90 receptacle. The rate of ascension in a mine-shaft is very rapid, and the bucket swings from side to side and does not rise in a straight line. Especially is that true of a runaway bucket after it leaves the shaft, in which case the swing- 95 ing becomes so pronounced as to frequently spill the contents of the bucket. It is evident, therefore, that a contact device must be provided whose engagement with the hoisting-receptacle must be positive and not affected by the 100 lateral motion of the receptacle. A tripping lever or kicker would not fulfil these requirements, as the swinging bucket frequently entirely avoids engagement therewith or effects such uncertain engagement as to improperly 105 operate the mechanism controlled thereby. I, on the other hand, prefer to provide a pair of swinging doors which block the entire pathway of the bucket and which are so geared together that they will at all times open in a uni- 110 form manner. I also prefer to provide a guide of such a design as to guide the swinging lurching bucket into fair engagement with the doors.

I have shown my invention applied to band- 115 brakes for the sake of illustration; but it is clear that the same may readily be applied to post, disk, or any other known form of braking mechanism without trouble.

I have shown a bucket in the drawing; 120 but it will be understood that a cage or other form of hoisting-receptacle may be substituted.

Although for the sake of clearness I have described the accompanying illustration of 125 my invention with great minuteness, I do not wish to limit myself thereby, but

I claim broadly—

1. In hoisting mechanism, a hoist, a brake adapted to be applied to said hoist, a hoisting- 130

receptacle, a pair of swing-doors operatively connected together and normally extending into the path of said hoisting-receptacle and to be engaged thereby when said receptacle rises to a predetermined point and connecting means between said swing-doors and said brake so that when said doors are engaged by said hoisting-receptacle said brake is set on said hoist.

10 2. In hoisting mechanism, a hoist, a brake adapted to be applied to said hoist, a hoisting-receptacle, a pair of swing-doors operatively connected together and normally extending into the path of said hoisting-receptacle and
15 to be engaged thereby when said receptacle rises to a predetermined point, a guide to effect uniform engagement between said swing-doors and said hoisting-receptacle and connecting means between said swing-doors and
20 said brake so that when said swing-doors are engaged by said hoisting-receptacle said brake is set on said hoist.

3. In hoisting mechanism, a hoist, a brake adapted to be applied to said hoist, a hoisting-
25 receptacle, a pair of swing-doors operatively connected together and normally extending into the path of said hoisting-receptacle and

to be engaged thereby when said receptacle rises to a predetermined point and to be swung back out of the path of said receptacle, 30 connecting means between said swing-doors and said brake so that when said doors are engaged by said receptacle said brake is set on said hoist and means for retaining said doors in their swung-back position. 35

4. In hoisting mechanism, a hoist, a brake adapted to be applied to said hoist, a hoisting-receptacle operated by said hoist, a pair of swing-doors operatively connected together and normally extending substantially across 40 the entire pathway of said hoist and adapted to be engaged by said receptacle when it rises to a predetermined point, operative means connecting said swing-doors and said brake so that when said doors are engaged by said 45 hoisting-receptacle said brake is set on said hoist and a spring-tension device interposed in said last-mentioned operative means.

Signed at Georgetown, Colorado, this 31st day of December, 1904.

WILLIAM COOPER.

Witnesses:

GEO. CAMPBELL,
MARY McCLUSKEY.