F. E. ARNDT.

SAFETY STOP FOR HOISTING DRUMS.

APPLICATION FILED MAR. 26, 1921.

1,412,643. Patented Apr. 11, 1922.

2 SHEETS—SHEET 1.

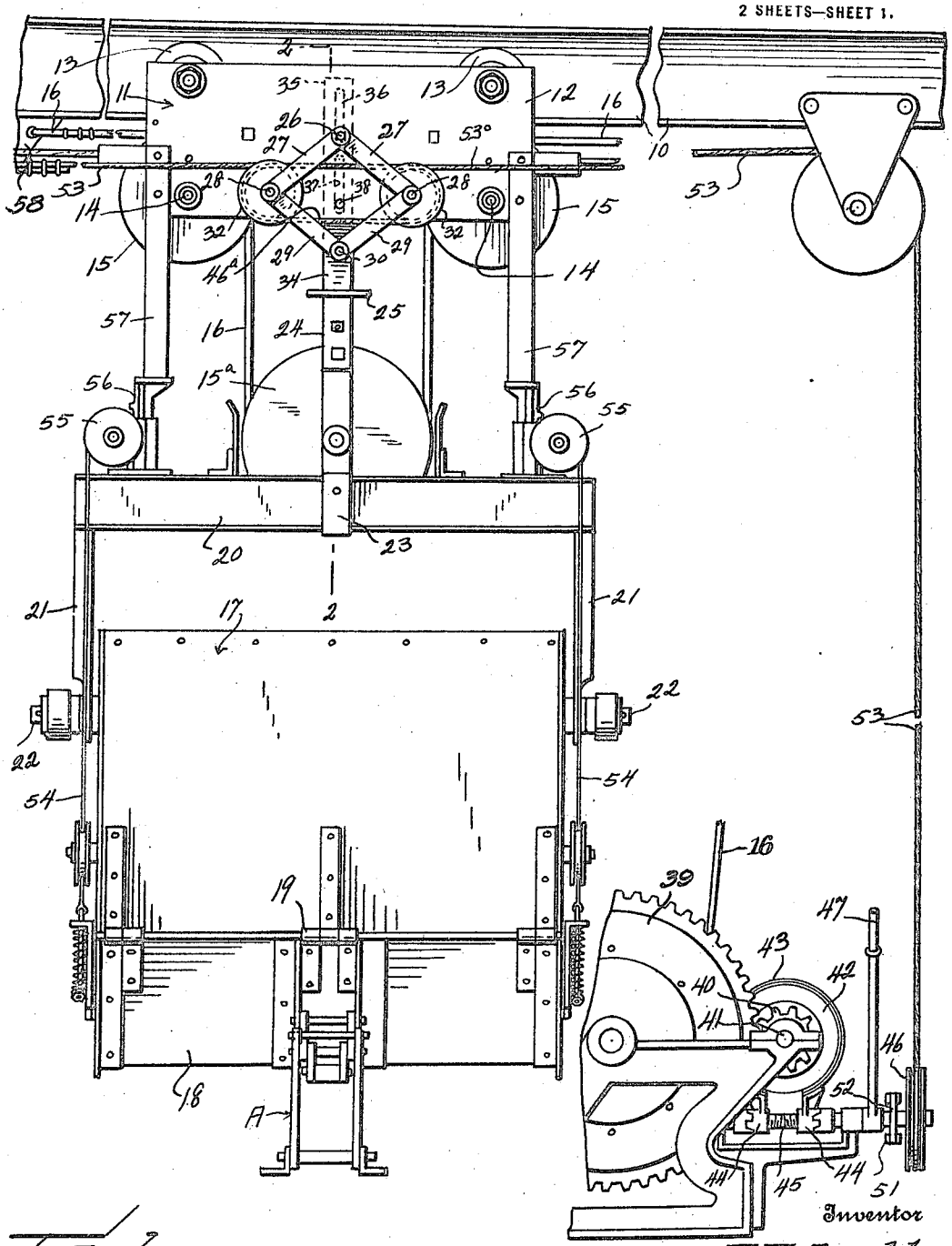


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

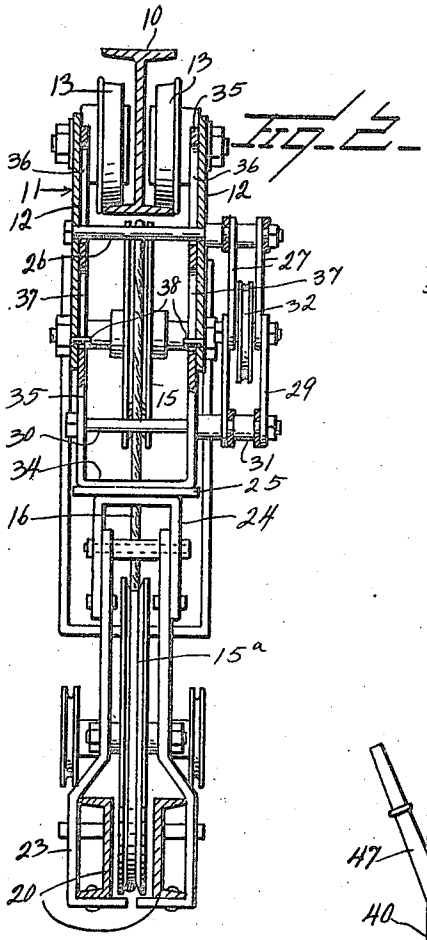


Fig. 3.

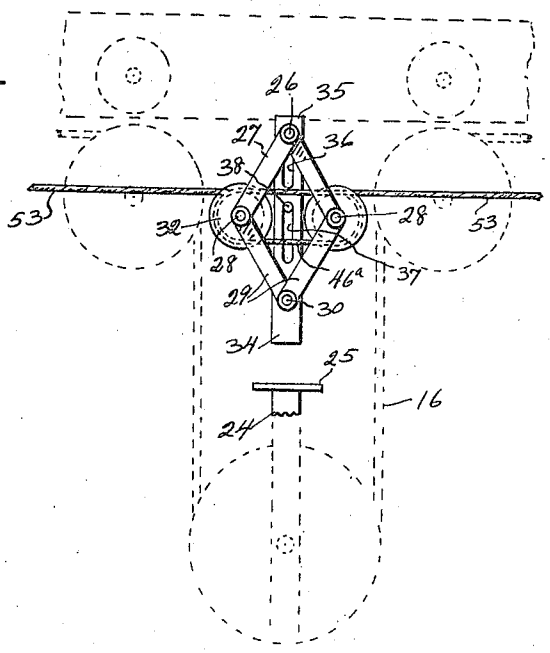
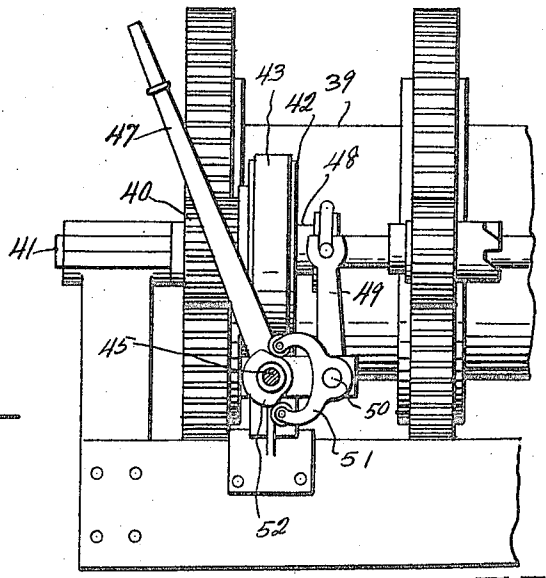


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANKLIN E. ARNDT, OF GALION, OHIO, ASSIGNOR TO THE GALION IRON WORKS & MFG. CO., OF GALION, OHIO, A CORPORATION OF OHIO.

SAFETY STOP FOR HOISTING DRUMS.

1,412,643. Specification of Letters Patent. Patented Apr. 11, 1922.

Application filed March 26, 1921. Serial No. 455,904.

To all whom it may concern:

Be it known that I, FRANKLIN E. ARNDT, a citizen of the United States, residing at Galion, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Safety Stops for Hoisting Drums, of which the following is a specification.

This invention relates to conveyor systems, and particularly to conveyor or material transporting systems in which a hoisting bucket is used raised or lowered by means of a winding drum, the drum being controlled by a clutch and lever and by a brake.

In systems of this character, it often occurs that the operator does not throw off the clutch and apply the brake at the proper time, and as a consequence the bucket is drawn too far upward and comes in contact with some fixed member, as for instance the carrier for the bucket, and the strain either breaks the cable or breaks the carrier or other impediment which the bucket mechanism has struck or breaks the bucket mechanism.

The general object of my invention is to provide automatic means for preventing this trouble, and more particularly to provide means for automatically throwing off the clutch of the winding drum and applying a brake thereto when the bucket has risen to its highest position, this mechanism, however, not preventing the proper operation of the clutch and brake by the operator or in any way preventing the throwing off of the brake and the throwing in of the clutch when the operator desires to allow the bucket to descend.

A further object is to provide mechanism of this character which includes a controlling cable operatively connected to the clutch and brake so that when the cable is pulled in one direction the clutch will be thrown out and the brake will be operated, and in the other direction the clutch will be thrown in and the brake released, and provide means for exerting a draft upon the cable comprising a member to which the cable is operatively connected, this member being mounted for movement in a direction to exert a strain upon the cable, and provide upon the bucket means engaging said member and causing it to shift to exert the strain when the bucket has arrived at a predetermined point in its upward movement.

Other objects have to do with the details of construction and arrangement of parts as will more fully appear hereinafter.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of a bucket and carrier constructed in accordance with my invention, this view also showing in elevation the hoisting means for the carrier and the clutch operating means;

Figure 2 is a sectional view on the line 2—2 of Figure 1;

Figure 3 is an elevation of the clutch shifting device in its contracted position when the bucket is lowered, the supporting carrier and the hoisting bucket being shown in dotted lines;

Figure 4 is a front elevation of the hoisting drum and allied mechanism.

Referring to these drawings, 10 designates an I-beam constituting a rail upon which the bucket support, as for instance the bucket carrier 11 moves. This carrier consists of the two laterally disposed plates 12 which carry at their upper corners the supporting wheels 13 which engage the rail. These plates 12 are spaced from each other in any suitable manner and extend below the rail and carry at their lower corners the transverse shafts 14 upon which the grooved wheels or sheaves 15 are mounted. A cable 16 passes over these sheaves, that portion of the cable between the sheaves extending downward in the form of a bight to engage a grooved wheel or sheave 15^a mounted upon the bucket 17. The bucket 17 is of any usual or ordinary construction, but is preferably provided with doors 18 at its lower end which are normally closed to prevent the discharge of the contents of the bucket and which are hinged at 19. The means for holding these doors closed and the means for automatically opening the doors when the bucket has descended a predetermined distance form no part of my present invention but are fully illustrated and described in my pending application, Serial #455,903, filed of even date herewith.

Disposed above the bucket is a transverse bar formed of two channel beams 20 from which depend the hangers 21 which are pivotally secured, as at 22, to the upper portion of the bucket. The channel irons 20 which form the transverse supporting bar of the machine have attached to them the upwardly extending irons 23. These irons extend inward above the channel beams 20 and then

extend upward and at their upper ends are connected by a U-shaped strip 24 which carries upon it the plate 25. Extending through the plates 12 which form the carrier 11 is a bolt, pin or like member 26, this pin or bolt extending out beyond the front plate of the carrier, and pivotally connected to this pin or bolt are the downwardly diverging pairs of links 27. The outer ends of these links 27 are connected by pivot pins 28 to downwardly converging pairs of links 29 which are connected by a pivot pin or bolt 30. These pairs of links are spaced from each other by sleeves 31. Mounted upon the pivot pins 28 and between the pairs of links are the grooved wheels 32.

It will be obvious now that if the pivot pin 30 be moved upward, the links 27 and the links 29 will be shifted into a less angle with relation to each other and the wheels 32 will be forced laterally outward, and that when the pivot pin 30 descends the wheels 32 will be drawn toward each other.

Disposed between the plates 12 of the carrier is a U-shaped member 34 having upwardly extending arms 35. Both of these arms 35 are longitudinally slotted, as at 36, at their upper ends to travel upon the fixed pin or bolt 26, and below these slots 36 the upwardly extending arms 35 are longitudinally slotted, as at 37, and have sliding engagement with a transverse pin 38. The bolt or pin 30 passes across these arms 35, and thus it will be obvious that when the member 34 is shifted upward, the links 27 and 29 will be shifted toward a parallel position and the grooved wheels 32 will be moved away from each other. The U-shaped member 34 is disposed in a position where it is adapted to be struck by the head 25 of the U-shaped member 24 when the bucket has been raised into a predetermined proximity to the carrier 11.

While I do not wish to be limited to any particular form of winding drum, brake mechanism, clutch mechanism, or the like, I have illustrated for the purpose of raising or lowering the carrier a hoisting drum 39. This drum is driven by a pinion 40 loosely mounted upon a driving shaft 41. Associated with this pinion is a brake drum 42, over which extends a brake band 43. The lower end of this band is engaged by the two internally reversely screw-threaded collars 44. Passing through these collars is a reversely screw-threaded shaft 45, upon which is mounted the grooved controlling wheel 46 and the clutch lever 47. It will be obvious that upon a movement of the shaft 45 in one direction, the collars 44 will be shifted toward each other and thus the brake will be applied, and thus upon a rotation of the shaft in the opposite direction the collars will be drawn away from each other, thus releasing the brake.

As before stated, the pinion and the brake wheel are loose upon the shaft 41 but may be operatively connected for rotative movement with this shaft by means of a clutch member 48 actuated by an arm 49 extending from a short shaft 50 parallel to shaft 45. This shaft 50 carries upon it the two-armed yoke 51, the extremities of the arms being engageable by a cam 52 mounted upon the shaft 45. The cable 16 passes around the winding drum 39, and passing around and attached to the wheel 46 to be wound thereon is a cable 53. This cable extends upward from the wheel 46 and over any suitable guiding pulleys and then extends horizontally parallel to the beam 10 and is formed to provide a loop 46^a which passes around the pulleys 32 (see Fig. 3). The cable 53 then extends to any suitable bracket 58 on the beam 10 and is fast to this bracket.

When it is desired to lower the bucket, the lever 47 is shifted in a direction to release the brake band 43 by a rotation of the shaft 45 in one direction, thus leaving the drum 39 free to run idle and the weight of the bucket carries it downward. The movement of the lever to release the brake and the consequent rotation of shaft 41 will, of course, relieve strain upon the cable 53 which permits the wheels 32 to move toward each other, as soon as the member 24 has descended from engagement with the member 34.

The bucket moves downward and discharges its contents and when this has been accomplished the operator throws the lever 47 in a direction to throw the clutch 48 into engagement with the spur pinion 40 and the brake drum. Power is thus applied to the hoisting drum 39 and the bucket is hoisted. As soon as the head 25 strikes the member 34 it will shift the member 34 upward. This will force the pulleys 32 away from each other and place a strain upon the cable 53 which, through its connection with the wheel 46, will cause a rotation of the shaft 45. This rotation of the shaft will throw out the clutch and apply the brake and the brake will remain applied until the operator again shifts the lever 47 in a direction to release the brake and permit the descent of the bucket.

While I have illustrated a particular construction of the hoisting drum, clutch and brake operating means, I do not wish to be limited thereto as this will form the subject of a separate application. It is to be understood that the operating cable 53 may be connected to any suitable clutch shifting and brake applying means provided the connection is such that when the pulleys 32 are moved away from each other the clutch will be released and the brake applied. Neither do I wish to be limited to the particular construction of the bucket illustrated, nor of the carrier as this also may be changed in any way without departing from the spirit of the invention.

I have illustrated in Figure 1 the means whereby the doors 18 are closed and the means whereby they are opened, but these form the subject matter of separate applications for patents. It may be stated, however, that the doors are automatically opened when the hoisting bucket descends into proximity to the dump upon which the material is to be discharged and that this automatic opening of the doors is controlled by the mechanism which is designated generally A. The doors are normally held closed, however, by cables 54 connected to the doors and passing over and attached to winding pulleys 55. These pulleys are operated to cause the closing of the doors by means of rack bars 56 which, when the bucket has risen to a predetermined extent, strike depending stops 57 mounted upon the carrier 11. When the bucket is lowered, these stops release the racks 56 and then when the doors of the bucket reach a point in proximity to the dump, the doors are automatically opened, as before stated.

I claim:—

1. The combination with a vertically movable element and hoisting means therefor, of controlling means for said element and hoisting means including a cable, one end of the cable being relatively fixed, an expansible and contractible member, the cable being formed to provide a bight in which said expansible and contractible member is located, and means adapted to expand said member and acting automatically when the element has moved to a predetermined point.

2. The combination with a vertically movable element, a cable therefor, hoisting means for the cable, a power transmitting member and a brake for said hoisting means, of means acting automatically when the element has moved upward to a predetermined height releasing the hoisting means from the power transmitting means and applying the brake and including a cable fixed at one end and at the other operatively connected to the hoisting means and brake, an expansible and contractible device, the last named cable being formed to provide a bight within which the expansible and contractible device is located, and means on the vertically movable element for engaging said device and expanding it upon a predetermined upward movement of the element.

3. In mechanism of the character described, a supporting member, sheaves mounted upon said supporting member, a cable passing over both sheaves, a winding drum around which the cable passes, a transmission shaft, a brake for the drum, a manually shiftable member adapted to be shifted to connect the drum to the transmission shaft and release the brake or in another position to disconnect the drum from the transmission shaft and apply the brake, an element having a sheave engaging said cable between the first named sheaves and adapted to be elevated or lowered by the cable, means for automatically shifting said shiftable member to disconnect the winding drum from the transmission shaft and apply the brake including a cable connected to the shiftable member, a strain applying member operatively engaged with said last named cable and disposed on said supporting member above the element, and means carried by said element and adapted to operatively engage the strain applying member to force it into a strain applying position.

4. In mechanism of the character described, a supporting member, sheaves mounted upon said supporting member, a cable passing over both sheaves, a winding drum around which the cable passes, a transmission shaft, a brake for the drum, a manually shiftable member adapted to be shifted to connect the drum to the transmission shaft and release the brake or in another position to disconnect the drum from the transmission shaft and apply the brake, an element having a sheave engaging said cable between the first named sheaves and adapted to be elevated or lowered by the cable, means for automatically shifting said shiftable member to disconnect the winding drum from the transmission shaft and apply the brake including a cable connected to the shiftable member at one end, the opposite end of the last named cable being fixed, a pair of wheels operatively mounted upon the supporting member for movement in opposite directions, the last named cable being looped to pass around said wheels, and a member carried by the element and adapted to force said wheels away from each other to thereby place a strain upon the last named cable connected to the wheels when the element has moved to a predetermined distance toward the supporting member.

5. In mechanism of the character described, a supporting member, sheaves mounted upon said supporting member, a cable passing over both sheaves, a winding drum around which the cable passes, a transmission shaft, a brake for the drum, a manually shiftable member adapted to be shifted to connect the drum to the transmission shaft and release the brake or in another position to disconnect the drum from the transmission shaft and apply the brake, an element having a sheave engaging said cable between the first named sheaves and adapted to be elevated or lowered by the cable, means for automatically shifting said shiftable member to disconnect the winding drum from the transmission shaft and apply the brake including a pair of wheels and a cable connected to the shiftable member at one end, the opposite end of the cable being fixed, the last named cable being looped to pass

around said wheels, downwardly divergent links pivotally supported at their upper ends and at their outer ends connected to said wheels, downwardly convergent links pivoted to each other at their lower ends and operatively connected to the wheels at their upper ends, and means carried by the element and extending above it and adapted when the element has risen to a predetermined height to operatively engage said downwardly converging links and force them toward an aligning relation to thereby shift the wheels outward in opposite directions and place the strain upon the last named cable.

6. In mechanism of the character described, a supporting member, sheaves mounted upon said supporting member, a cable passing over both sheaves, a winding drum around which the cable passes, a transmission shaft, a brake for the drum, a manually shiftable member adapted to be shifted to connect the drum to the transmission shaft and release the brake or in another position to disconnect the drum from the transmission shaft and apply the brake, an element having a sheave engaging said cable between the first named sheaves and adapted to be elevated or lowered by the cable, means for automatically shifting said shiftable member to disconnect the winding drum from the transmission shaft and apply the brake including a pair of wheels and a cable connected to the shiftable member at one end, the opposite end of the cable being fixed, the last named cable being looped to pass around said wheels, downwardly divergent links pivotally supported at their upper ends and at their outer ends connected to said wheels, downwardly convergent links pivoted to each other at their lower ends and operatively connected to the wheels at their upper ends, a member mounted for vertical movement upon said supporting member and extending downward below the lowermost links and operatively connected thereto, and a member mounted upon the element and extending above the upper end thereof and adapted to engage said last named member to shift it upward as the element reaches a predetermined point on its upward travel.

7. The combination with a vertically movable element, a cable therefor, mechanism for drawing up or letting out the cable, shiftable means for operatively connecting said last named mechanism with power or disconnecting it therefrom, of means for automatically operating said shiftable means comprising a cable connected at one end to the shiftable means, the other end of the cable being fixed, a pair of wheels around which said last named cable is looped, a member carried by the element and adapted to force said wheels away from each other to thereby place a strain upon the cable when the element has reached a predetermined point.

In testimony whereof I affix my signature.

FRANKLIN E. ARNDT.