Oct. 22, 1929. W. E. HOWLETT 1,732,232

AUTOMATIC HOIST

Filed May 5, 1927 2 Sheets-Sheet 1

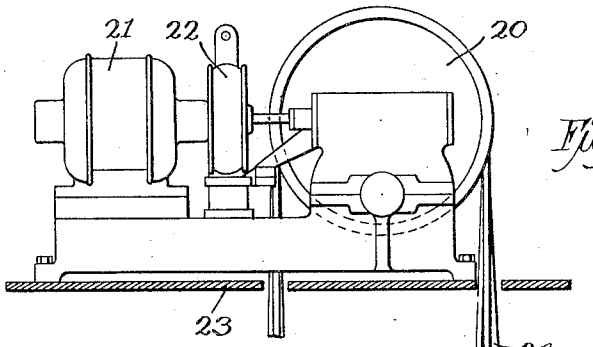


Fig. 1

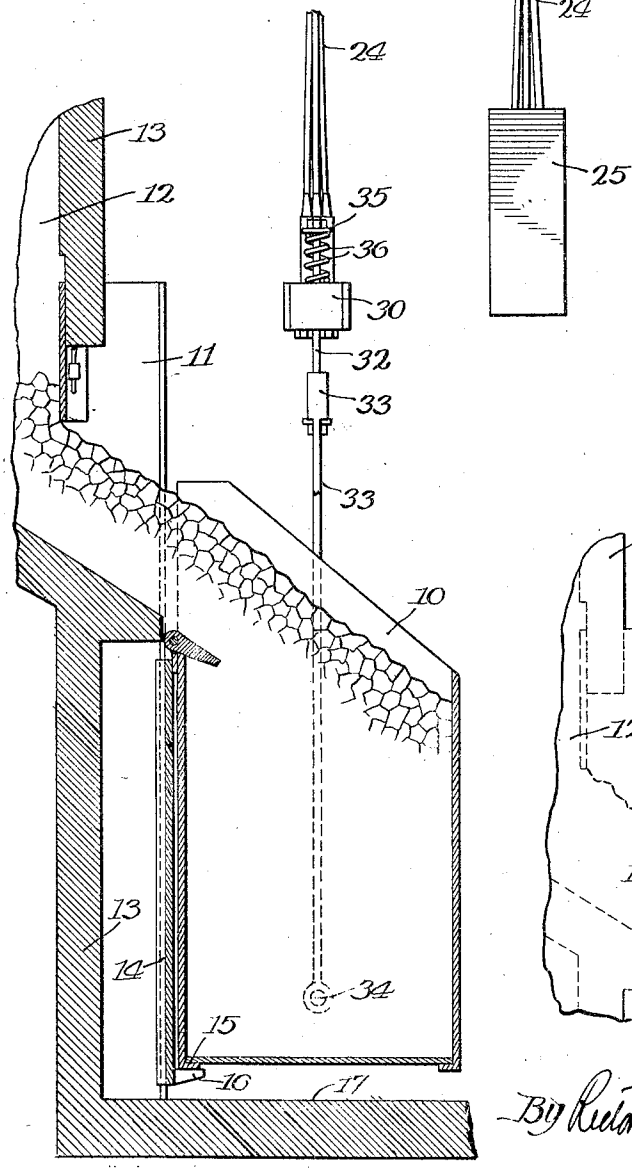
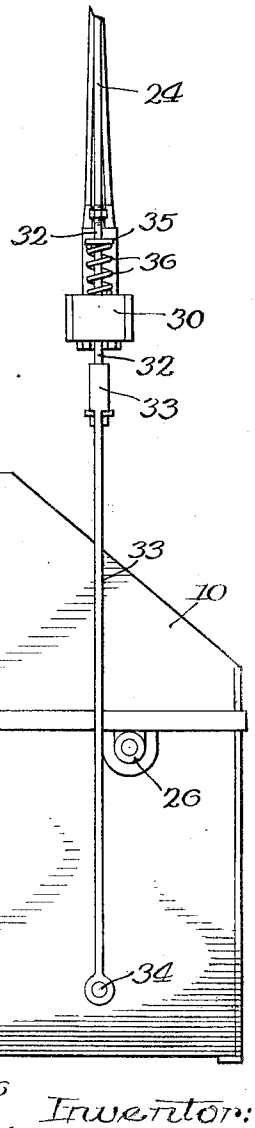


Fig. 2



Inventor:
William E. Howlett
By Rieke, Hobbs, Davis & Macauley
Attys.

Oct. 22, 1929. W. E. HOWLETT 1,732,232

AUTOMATIC HOIST

Filed May 5, 1927 2 Sheets-Sheet 2

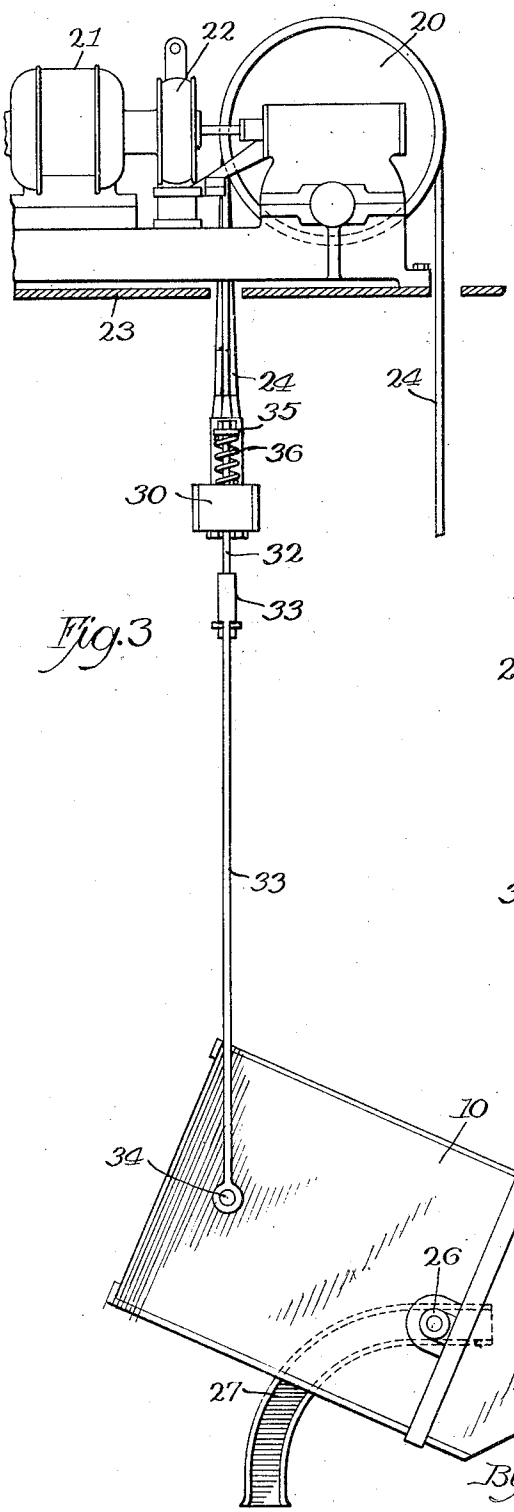


Fig. 3

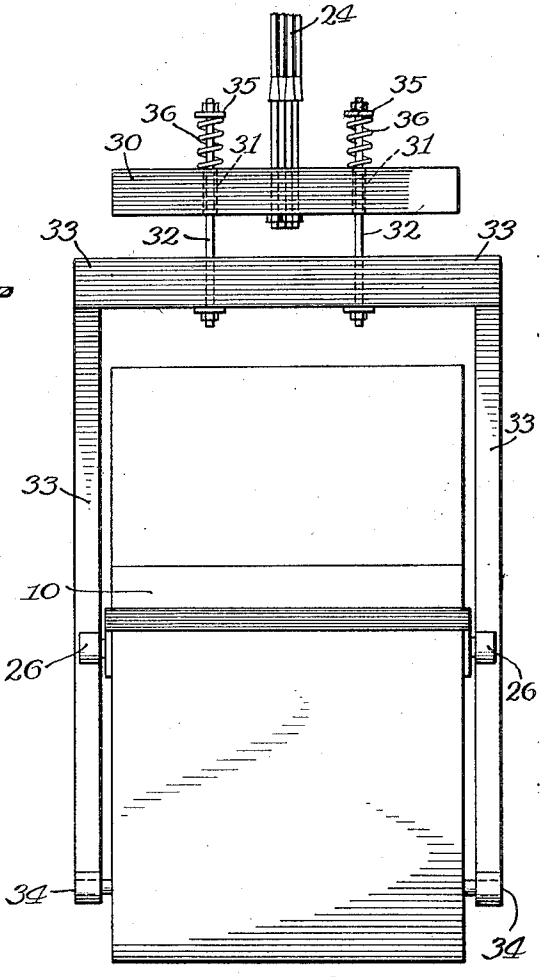


Fig. 4

Inventor:
William E. Howlett
By Victor, Hilton, Davis & Macauley Attys.

Patented Oct. 22, 1929 1,732,232

UNITED STATES PATENT OFFICE

WILLIAM E. HOWLETT, OF MOLINE, ILLINOIS, ASSIGNOR TO HOWLETT CONSTRUCTION COMPANY, OF MOLINE, ILLINOIS, A CORPORATION OF ILLINOIS

AUTOMATIC HOIST

Application filed May 5, 1927. Serial No. 188,885.

This invention relates to an automatic hoist. It is particularly applicable to railway coaling station hoists but it may be also applied to hoists used for other purposes.

Automatic coaling hoists usually include an engine or electric motor driven hoisting drum over which passes a cable connected at one end to a hoisting bucket and the other end to a counterweight. When an electric motor is used switch devices are provided for reversing it to reverse the direction of rotation of the drum to raise the bucket up and down in the hoisting tower, and a brake is employed for stopping the hoisting apparatus at the time the reversal takes place. It will be evident that, with the hoisting drum located above the bucket and with the cable passing from the bucket over the drum to the counterweight without being wound about the drum, if the bucket is grounded or if its weight is relieved from the cable in any other manner, the cable will be slackened and its grip or traction on the drum will be destroyed so that the hoisting drum will spin relative to it. This soon wears out the cable and is such an undesirable condition that it has been considered impractical to locate the hoisting apparatus above the hoisting bucket where a slackening of the cable will result in the spinning of the drum relative to it. Instead, the hoisting apparatus has been mounted off at one side and below the top of the hoisting tower and the hoisting cable has first been passed over pulleys and then down to the drum of the hoisting apparatus as illustrated, for example, in Fig. 5 of my prior Patent #1,592,602, July 13, 1926. This not only requires a longer cable and more parts, but it also introduces more friction in the apparatus and makes necessary the building of an addition to the hoisting tower to house the hoisting apparatus.

The present invention is directed to the provision of an improved automatic hoist in which the hoisting apparatus may be mounted in the top of the tower above the hoisting bucket and slackening of the cable prevented when the weight of the bucket is temporarily relieved from the cable.

The general object of the invention is to provide an improved automatic hoist.

A more particular object is to provide an improved automatic coal hoist in which the hoisting apparatus is located in the hoisting tower above the hoisting bucket.

A still further object is to provide, in a hoisting apparatus of the kind described, means for automatically preventing the hoisting cable from being slackened when the weight on one end of the cable is relieved.

Another object is to provide a means for automatically applying additional force to cause the descent of a hoisting bucket when the same is obstructed during its descent.

Other objects and advantages of the invention will hereinafter appear.

An embodiment of the invention is shown in the accompanying drawings in which:

Figure 1 is a side elevation and section of the automatic hoist showing the hoisting bucket in lowered position;

Fig. 2 is a similar side elevation of a portion of the hoist showing the hoisting bucket in the position it occupies when it is opening the door that permits coal to flow into the bucket;

Fig. 3 is a side elevation showing the position of the parts when the bucket is being dumped at the top of the hoisting tower;

Fig. 4 is a side elevation of the hoisting bucket taken at right angles to Fig. 2.

The hoisting bucket and the electrical hoisting apparatus employed in the present invention are of the type disclosed in my prior Patent No. 1,592,602, July 13, 1926, and they will be described only briefly in this application, reference being made to said patent and to the improvement thereon shown in Patent No. 1,622,589, March 29, 1927.

The hoisting bucket 10 comprises a rectangular receptacle which is lowered to, and raised from, an opening 11 in the bin 12 in the hoisting tower 13. The opening 11 through which material passes into the bucket when the bucket is lowered is closed by a door 14 normally urged to closed position by weights which are not shown herein but are fully described in the above mentioned prior patents.

This door is opened during the descent of

the bucket 10 by the bucket itself whose bottom edge 15 strikes projections 16 on the door and carries the door downwardly. The bucket is stopped by the hoist in a proper lowered position for loading which is short of the bottom 17 of the tower, it not being desirable to ground the bucket during the operation of the hoist, as this would tend to slacken the cable.

The automatic hoisting apparatus includes a drum 20 rotated by an electric motor 21 and stopped by a brake 22. When the hoisting bucket reaches either the bottom or the top of its path of movement, the electric motor is automatically reversed and the brake 22 applied, the control of these parts being by switching devices well known in the art. The brake 22 is set to stop the bucket at the proper point and a proper time interval is provided in the reversal of the motor to permit the hoisting bucket to be loaded at the bottom of the tower and to be dumped at the top of the tower before its direction is reversed. The hoisting apparatus is mounted on a platform 23 located at the top of the tower 13 and directly above the hoisting bucket 10 so that the hoisting apparatus is housed within the tower and in a position where its hoisting efforts may be applied directly to the bucket.

A hoisting cable 24, preferably having several strands as shown in Fig. 1, passes over the drum 20. One end of the cable is connected to a counterweight 25 which assists in raising the bucket and keeps the cable tightly in engagement with the drum to prevent slipping or, to use the term employed by engineers, to provide "traction."

It will be evident by reference to Fig. 1 that if either the bucket 10 or the counterweight 25 is grounded or its weight otherwise relieved from the cable 24, the cable will be slackened and since the cable merely passes over the drum without passing around it, it will likewise be clear that if the cable is slackened there will be a tendency for the drum to spin relative to it. This not only wears out the cable rapidly but it relieves a load from the hoisting apparatus and permits it to spin rapidly and to operate in a jerky and undesirable manner. Ordinarily, the counterweight 25 is free of obstructions and has plenty of room within which to operate so that it is never grounded or its weight otherwise taken from the cable but the weight of the bucket 10 may be taken from the cable under several circumstances. For example, it may be that, owing to lack of lubrication or because of some obstruction, the door 14 will not descend easily and, when the bucket strikes the projections 16, its descent is arrested to such an extent that substantially the entire weight of the bucket, which is then empty, is taken by the door. It may also happen that the brake 22 will fail to stop the bucket in its proper lowered position with the result that the bucket will ground on the bottom 17 of the tower which also relieves the weight of the bucket from the cable. Another condition which tends to relieve the weight of the bucket from the cable is that illustrated in Fig. 3 where the bucket is shown being dumped. This dumping action occurs at the top of the tower where the trunnions 26 on the hoisting bucket engage in guideways 27 and the upward pull of the hoisting cable turns the bucket to the dumping position of Fig. 3. In this position the most of the weight of the bucket is carried by the guideways 27 and there would be a tendency to slacken the cable and permit the drum to spin.

As previously stated, these difficulties have been considered so insurmountable that the mounting of the hoisting apparatus directly above the bucket with the cable passing over the drum as illustrated in Fig. 1, has been considered impractical. Constructions of this type which have been attempted have been abandoned and the art has almost universally employed constructions of the type illustrated in Fig. 5 of my prior Patent No. 1,592,602. The present invention, however, has made possible the success of a hoist in which the hoisting apparatus is mounted directly above the bucket with the cable from the hoisting bucket passing directly over the drum to a counterweight.

Instead of connecting the hoisting cable 24 directly to the bucket 10, it is connected to a weight 30 which is termed a compensating weight. This weight may be of any suitable type the preferred construction being a long weight of rectangular cross-section as illustrated in Figs. 1 and 4. The weight is provided with openings 31 in which are loosely mounted rods 32 carried by the rigid bail 33 pivoted to the hoisting bucket 10 on the studs 34. The rods 32 have nuts threaded on their ends and washers 35 bear against these nuts to form stops for springs 36 which are interposed between the stops and the top surface of the weight 30.

Assume that the bucket 10 is arrested during its descent by the door 14 or by some other obstruction such that the weight of the bucket is relieved from the cable to a sufficient extent to ordinarily cause the cable to slacken. With the present invention the cable does not slacken because even though the weight of the bucket is taken by the door or some other obstruction, the weight 30 maintains a substantial tension on the cable which is amply sufficient to maintain good traction. When the bucket 10 stops the weight 30 moves downwardly on the rods 32 as illustrated in Fig. 2. If the bucket 10 is held up only momentarily it may again start downward before the weight 30 reaches the end of its travel, but, if the bucket is not released im-

mediately, the weight 30 will move down till it strikes the top of the rigid bail 33. This delivers a sharp blow on the bail, which, under all ordinary circumstances, will loosen the bucket and start it on its travel downward. During this time the weight 30 has maintained tension on the cable 24, the action being in the nature of a continuous one, that is, the weight 30 strikes the bail 33 a sudden blow which drives the bucket on downwardly and permits the weight 30 to continue keeping the cable under tension. When the bucket is loosened and when it drops the weight is not again applied to the cable with the sudden jerk but the stop washers 35 strike the springs 36 which cushion the weight of the bucket as it is again applied to the cable.

The weight 30 thus not only serves to keep the cable under tension in the event the bucket is arrested during its descent but it also acts to apply additional force to cause the bucket to continue its descent. It is useful in dislodging the bucket in the event it becomes stuck.

Another condition under which the weight acts is in connection with the stopping of the bucket at the bottom of its travel. The brake 22 acts to stop the hoisting apparatus to stop the bucket in loading position which is short of the bottom 17 of the tower. The distance of travel of the hoisting apparatus through which the brake must operate is relatively small so that if the brake should become worn or should slip for any reason it is quite possible for the bucket to move on down farther and ground on the bottom of the tower which would ordinarily slacken the cable. If the brake slips slightly when the present invention is employed the cable is not slackened immediately because the weight 30 maintains its tension. If the bucket moves on down to the bottom of the tower, there is still a further period of time during which the hoist may reverse, that is, the period it takes the weight 30 to move downward into contact with the bail 33. This time is ordinarily sufficient to permit the hoist to reverse and hence the cable is not slackened because of the grounding of the bucket. Viewed from the standpoint of the permissible travel of the hoisting apparatus during which the brake may operate, it will be clear that the invention provides a greater range of distance of travel of the hoisting apparatus during which the brake 22 may operate without slackening the cable and this is secured without requiring any increased clearance for the bucket at the bottom of the tower.

Another condition under which the invention operates to maintain tension on the cable is that illustrated in Fig. 3 where the bucket is shown being dumped. When the bucket is raised to the top of the tower the trunnions 26 engage the guide 27 and the bail 33 moves the bottom of the bucket upwardly until the bucket is turned to the Fig. 3 position where the most of its weight is borne by the guides 27. Under these conditions there would ordinarily be a tendency for the cable 24 to slacken but such slackening is prevented by the weight 30 which maintains the cable under tension. Here again the weight 30 becomes active to dislodge the bucket in the event it should stick in the guideways 27 for any reason. As the hoist reverses the weight 30 descends and hits the bail 33 a blow to drive the bucket downwardly in the event the bucket has not already moved.

If desired, the same construction can be employed in connection with the counterweights 25 but ordinarily this is not necessary and such construction has not been illustrated in the present drawings.

It is to be understood that the structure shown is for purposes of illustration only and that variations may be made in it without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. An automatic traction hoist having a hoisting drum, a cable passing over but not around said drum, a bucket on one end of the cable and a weight on the other to maintain the cable under tension to maintain it in tractive relation to the drum, and a compensating weight connected to the cable so that when the weight of the bucket on the cable is temporarily lessened the weight acts automatically to maintain the cable under tension.

2. An automatic traction hoist having a hoisting drum, a cable passing over but not around the drum, a bucket on one end and a weight on the other end of the cable to maintain it under tension to maintain it in tractive relation to the drum, a compensating weight connected to the cable on the bucket side thereof and slidable connections between the compensating weight and the bucket to permit the weight to move downwardly to maintain tension on the cable when the descent of the bucket is arrested.

3. An automatic traction hoist having a hoisting drum, a cable passing over said drum, a hoisting bucket on one end and a weight on the other end of the cable to maintain it under tension to maintain it in tractive relation to the drum, means for causing the bucket to be dumped when it reaches a raised position, at which position the weight of the bucket is relieved from the cable, and means for maintaining the cable under tension when the weight of the bucket is relieved from the cable during the dumping operation.

4. An automatic traction hoist having a hoisting bucket, a hoisting apparatus including a hoisting drum mounted above the path of the bucket, a cable connected to a counterweight and passing over but not around the

drum and connected at its other end through a compensating weight to the bucket whereby the cable is maintained under tension over said drum to maintain it in tractive engagement with said drum, and slidable connections between the bucket and the compensating weight permitting the weight to move down relative to the bucket to maintain the cable under tension when the weight of the bucket is relieved from the cable.

5. An automatic hoist having a hoisting bucket, a rigid bail pivoted thereto, rods extending upwardly from said bail, a weight slidably mounted on said rods, and a hoisting apparatus having a cable connected to said weight.

6. An automatic hoist having a hoisting bucket, a rigid bail pivoted thereto, rods projecting upwardly from said bail and having stops on their ends, a weight slidably mounted on said rods, springs positioned between the stops on the ends of the rods and said weight, and a hoisting apparatus having a cable connected to said weight.

7. An automatic hoist having a hoisting drum, a bucket, a cable connected to said bucket and operated by said drum for raising and lowering said bucket, and means for automatically applying additional force to said bucket to cause descent thereof when the normal descent of the bucket is obstructed.

8. An automatic traction hoist having a hoisting drum, a cable passing over but not around said drum, a bucket connected to one end of the cable, a weight connected to the other end of the cable, the tractive effort of said cable being dependent upon the cable being maintained under tension, and means for automatically applying additional force to cause descent of said bucket when the normal descent thereof is obstructed, said means also acting to maintain the cable under tension when the weight of the bucket thereon is relieved.

9. An automatic hoist having a hoisting bucket, means for raising and lowering said bucket, and a weight automatically brought into action by said raising and lowering means for striking said bucket to force the same downwardly when the bucket is obstructed in its normal downward movement.

10. The combination in an automatic hoist of a hoisting bucket, means for raising and lowering said bucket including a cable, a weight connected to the cable, and slidable connections between the weight and the bucket such that when the bucket is arrested during its descent the weight will move downwardly to strike it.

In testimony whereof, I have subscribed my name.

WILLIAM E. HOWLETT.