W. COOPER.

SAFETY DEVICE.

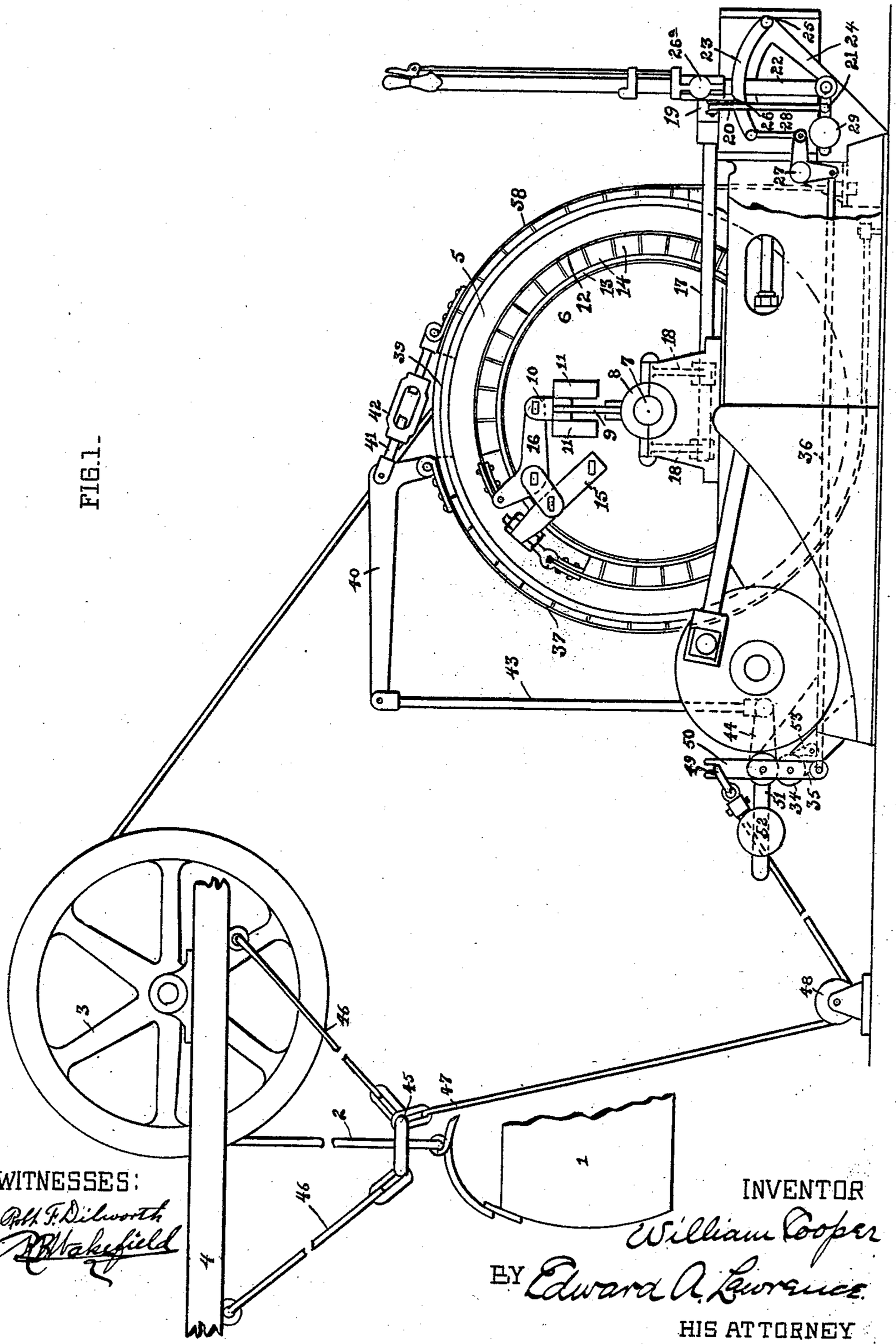
APPLICATION FILED NOV. 9, 1907.

928,903.

Patented July 20, 1909.

2 SHEETS—SHEET 1.

FIG.1.



WITNESSES:

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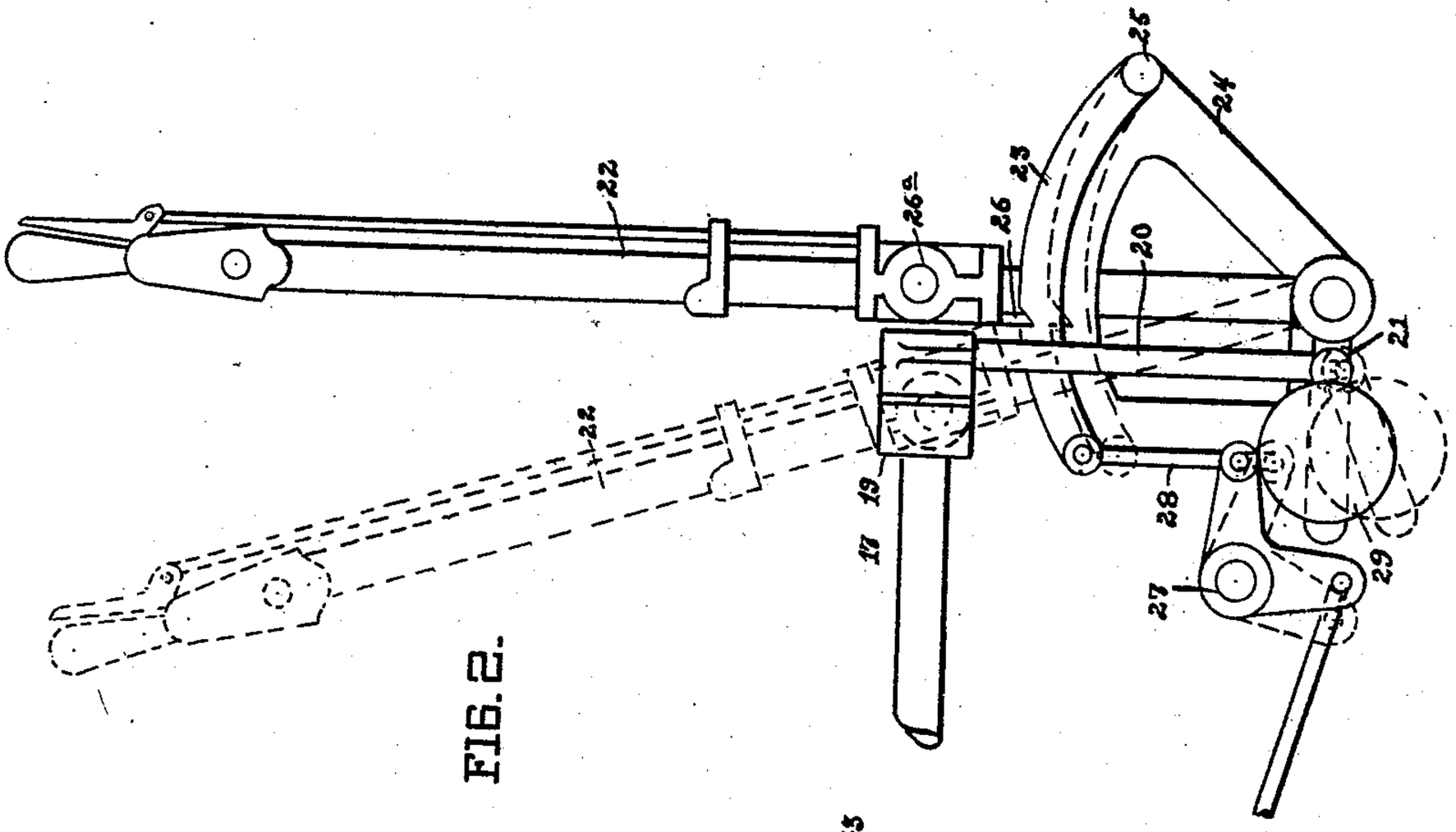

FIG. 2.

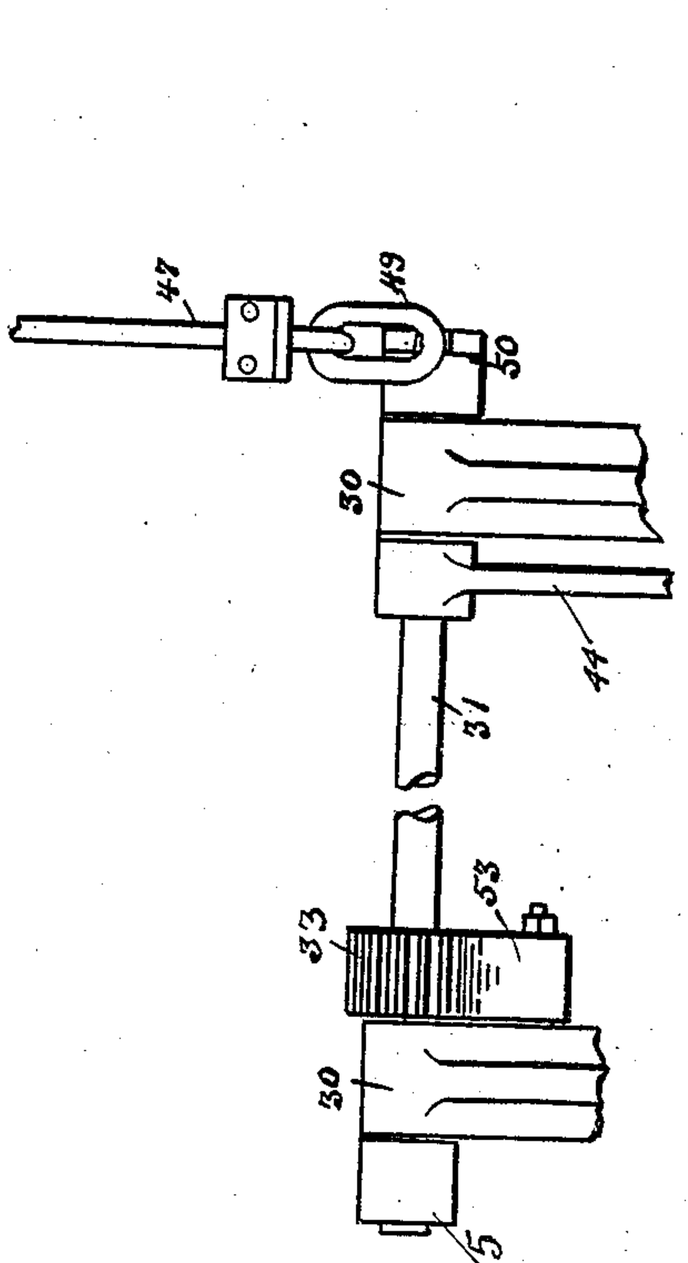

FIG. 3.

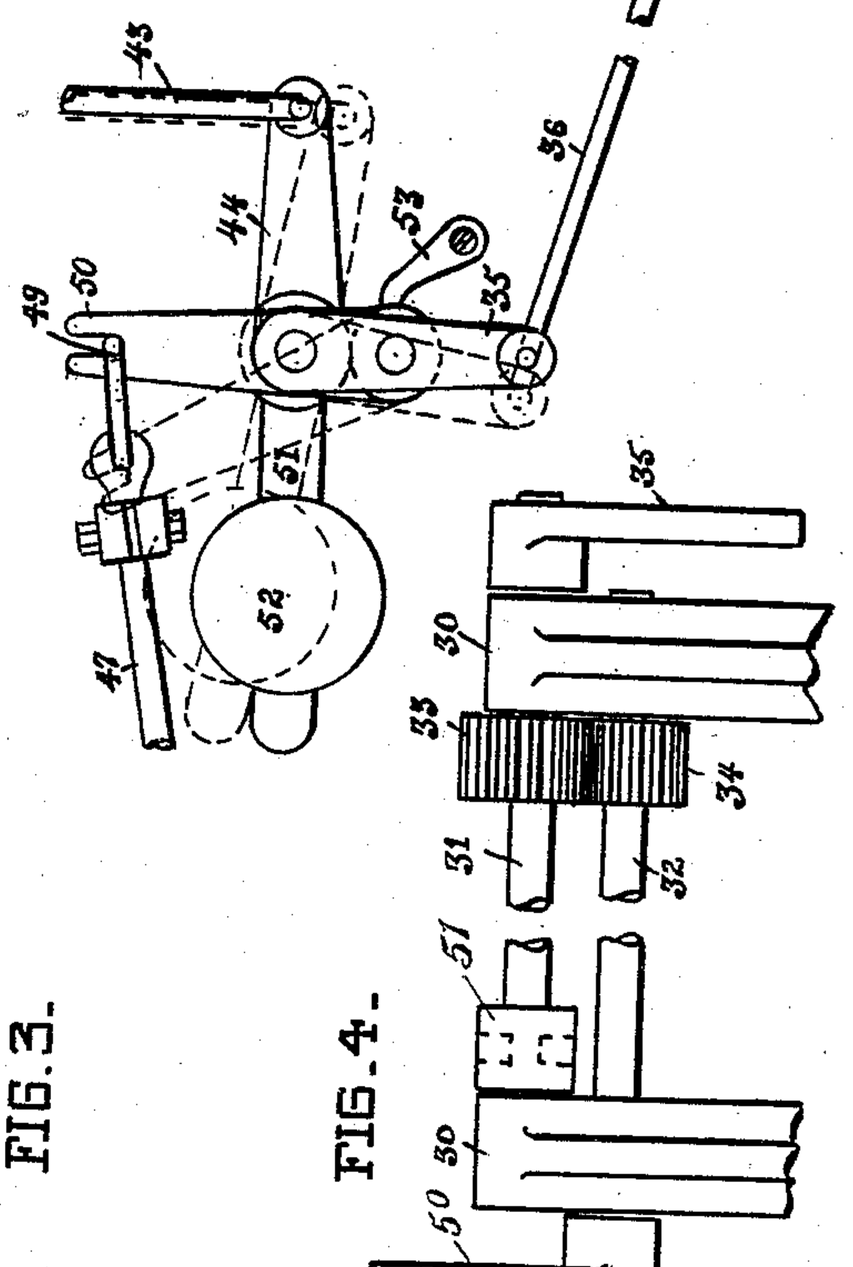

FIG. 4.

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SAFETY DEVICE.

No. 928,903. Specification of Letters Patent. Patented July 20, 1909.

Application filed November 9, 1907. Serial No. 401,375.

To all whom it may concern:

Be it known that I, WILLIAM COOPER, a citizen of the United States, and residing in the city of Georgetown, in the county of Clear Creek and State of Colorado, have invented or discovered new and useful Improvements in Safety Devices, of which the following is a specification.

My invention consists in new and improved safety devices adapted to be used in connection with hoisting and hauling mechanism of all kinds, such as mining and other draft machinery.

A frequent accident in the operation of hoisting and similar mechanisms, and one fraught with great danger to life and property, is due to loss of control over the hoist or other source of power, resulting in an "overwind" and dashing the cage, bucket skip or other receptacle against the sheave, gallows frame or structure at the mouth of the mine. In such cases the power machinery refuses to sepond to the usual controlling apparatus and automatic means must be provided to stop the receptacle before it is wrecked and its contents destroyed I therefore provide automatic means for releasing the rotating or winding power from the cable drum or other winding mechanism, so that the power may be shut off from the receptacle.

To overcome the impetus where the winding up of the cable is effected at a rapid rate, and the mere cutting off of the power would not effect a sufficiently rapid cessation of motion to prevent an accident, I also provide automatic means for applying a brake to the winding mechanism so that the same is brought to a substantially immediate stop as soon as the power is shut off. I also provide means for locking the brake in its operative position to maintain the mechanism stationary until it is desired to release the same.

I show means, interposed in the path of the receptacle and adapted to be engaged thereby, controlling the mechanism for releasing the power and setting the brake on the winding mechanism as above described. Said actuating means are preferably located above the mouth of the shaft or in advance of the mouth of the mine to allow the normal loading and unloading of the receptacle without interference, but at the same time are spaced sufficiently from the sheave, gallows frame or superstructure to be engaged and operated by the runaway receptacle before the same is in danger of being wrecked. The form of actuating means to be engaged by the runaway receptacle is of new and improved design, being both simple and inexpensive but at the same time positive and reliable in its action.

In the accompanying drawings, Figure 1 is a side elevation showing my invention applied to a shaft mine; Fig. 2 is an enlarged detail of a portion of the same; Fig. 3 is a plan view of a portion of the mechanism shown in Fig. 2, and Fig. 4 is a front elevation of the same.

The following is a detail description of the drawings, which are, however, merely illustrative of the practical embodiment of my invention and are not intended to limit the same to the construction shown.

1 represents the receptacle, in this case shown for the sake of illustration as a hoisting bucket, the type of receptacle used on a majority of shaft mines.

2 is the cable running over sheave 3 supported above, the mouth of the shaft, not shown, by gallows frame 4.

5 is the cable drum of the usual type on which cable 2 is wound. Power is applied to the cable drum by means of the clutch carried by disk 6 rotating with power shaft 7. On power shaft 7 is slidably mounted sleeve 8 to which is pivoted one end of link 9 whose other end is pivoted to slide 10 moving between guides 11—11 carried by disk 6.

12 is the clutch encircling the flange 13 of the cable spool 5 and 14—14 are wooden bearing blocks attached to said band and adapted to frictionally engage said flange 13 when the clutch is thrown on. One end of the band 12 is attached to member 15 fixed to disk 6 while the other end of said band is pivotally attached to the outer arm of bell crank lever 16 pivoted to the member 15. The other arm of said lever 16 is pivoted to the slide 10.

17 is a shaft suitably journaled in the engine frame adjacent to and parallel with the disk 6 and 18—18 are arms rigidly attached to said shaft and carrying on their free ends rollers, not shown, which engage a circumferential groove in the sleeve 8. The other end of said shaft 17 is provided with a rigidly attached arm 19 which is pivotally connected with the upper end of a link 20. The lower end of said link is pivotally attached

to the arm 21 intermediately of its length which arm is rigidly attached to the lower end of hand lever 22. It is evident that should lever 22 be thrown toward the left, as shown in dotted lines in Fig. 2, the shaft 17 would be slightly rotated away from disk 6 thus drawing sleeve 8 outwardly on shaft 7 and releasing the clutch, thereby throwing the power off the cable spool. However, if the lever 22 be thrown toward the right, as shown in solid lines in Figs. 1 and 2, the shaft 17 would be rotated toward the disk and the clutch would be thrown on to the cable spool causing the same to rotate with shaft 7. The above clutch construction is of the usual type and has been described simply for the sake of clearness.

To lock the clutch lever 22, maintaining the clutch in its operative position, I provide a quadrant 23 which is pivoted at its rear end to sector frame 24 as at 25. Adapted to engage the teeth, 26, of the quadrant 23 is spring latch 26ª carried by lever 22. Pivoted to the engine bed is bell crank lever 27, to one arm of which is pivoted the lower end of link 28, the upper end of which is pivoted to the free end of quadrant 23. It is evident that when the bell crank lever is in the position shown in dotted lines in Fig. 2, the quadrant is drawn downwardly out of engagement with the spring latch carried by the lever 22, releasing said lever.

29 is a weight adjustably mounted on arm 21 of lever 22 so that when said lever is released, said weight causes it to swing toward the left, as in dotted lines in Fig. 2, thus throwing the clutch off the cable drum 5 and releasing said cable from the winding power.

30—30 represent a pair of standards extending upwardly from the forward portion of the engine bed and having journaled between them two shafts, 31 and 32, in the same vertical plane. On the upper shaft 31, is rigidly mounted a gear 33 which meshes with a similar gear 34 similarly mounted on shaft 32 so that said shafts move in unison but in opposite directions. The gear 34 is preferably of less diameter than gear 33 so that when said shafts rotate in unison, the shaft 32 moves through a greater arc of a circle than the upper shaft 31. To one end of shaft 31, outside of the adjacent standard 30, is rigidly secured the arm 35 to which is pivotally attached the forward end of connecting rod 36 whose rear end is pivotally attached to one arm of the bell crank lever 27.

The braking apparatus consists of two bands, 37 and 38 secured at one end to the engine bed and adapted to frictionally engage the circumferential face 39 of the drum 5. The free end of band 37 is pivoted to the short arm of bell crank lever 40. The free end of band 38 is pivotally secured to the angle of said bell crank lever by link 41 which is preferably made in two parts united by turnbuckle 42 to take up slack. It is evident that when the long arm of said bell crank lever is elevated, the tension on the brake is relieved but when the said arm of the bell crank lever is depressed, the brake is tightened on the drum. The long arm of the bell crank lever 40 is pivoted to the upper end of the connecting rod 43 whose lower end is pivotally connected to the free end of arm 44 rigidly attached to and rearwardly extending from shaft 31.

45 is a ring or annular body, preferably of metal, through which the cable 2 passes and which is suspended at a proper level below the gallows frame in the path of the bucket 1 by any convenient means, such as the cables or ropes 46—46 attached to the gallows frame. Attached to ring 45 is cable or rope 47 which may pass downwardly under pulley 48 fixed to the engine room floor. The other end of rope 47 is provided with a metal ring 49 adapted to engage the bifurcated end of arm 50 which is rigidly attached to the end of shaft 32 and normally maintains a vertical position as shown in full lines in Figs. 1 and 2. When the arm 50 assumes the position shown in dotted lines in Fig. 2, the ring 49 automatically slips off of and detaches itself from the said arm 50.

51 is an arm rigidly secured to shaft 31 and provided with an adjustable weight 52 which tends to normally hold the arms 44 and 35 in the positions shown in full lines in Figs. 1 and 2. In other words, the weight 52 normally holds the quadrant 23 in position to lock the lever 22 when the clutch is thrown on the cable drum. The weight also tends to raise the long arm of bell crank lever 40 thus releasing the brake from the cable drum and normally relieving the tension thereof. When the quadrant is in the position shown in full lines in Figs. 1 and 2, the clutch may be thrown off and on by the hand lever without interference on the part of my automatic mechanism above described.

53 is a ratchet or dog, pivoted to the engine bed and adapted to engage the teeth of gear 34 on shaft 32 thus locking, when desired, the shaft 32 in position to throw off the clutch and adjust the brake to the cable drum. By this means the brake is locked automatically on the drum when applied by the mechanism above described.

The operation of my invention is as follows:—Assuming that the brake is off of the cable spool and the clutch is thrown onto the same for the winding up of the bucket, in case a runaway of the bucket occurs, the bucket rushes up out of the shaft mouth and unless stopped will be dashed to pieces against sheave 3. However it encounters in its path the ring 45 which it forces upwardly thus pulling upward on rope 47. The

tension on rope 47 draws the arm 50 toward the left into the position shown in dotted lines in Fig. 2, at which point the loop 49 automatically disengages itself from the bifurcated end of arm 50, thus avoiding breakage of the apparatus from too much tension. The movement of the arm 50 rotates the lower shaft 32 counter clockwise which in turn rotates the upper shaft 31 clockwise through a lesser arc. The rotation of the shaft 31 draws arm 35 into the position shown in dotted lines in Fig. 2, thus drawing connecting rod 36 forwardly and dropping the forward end of quadrant 23 thus releasing the lever 22. The weight 29 will immediately cause said lever to drop into the position shown in dotted lines in Fig. 2, thus throwing the clutch off the cable spool and allowing the same to become idle. The rotation of shaft 31 also causes arm 44 to swing downwardly into the position shown in dotted lines in Fig. 2 thus drawing down connecting rod 43 and with it the long arm of bell crank lever 40 thus forcing the free ends of brake bands 37 and 38 toward each other and placing the brake into close frictional engagement with the face 39 of the cable drum. It is thus evident that the engagement of the member 45 by the bucket serves to both release the winding power from the cable drum and set the brake on the same. The engagement of the dog 53 with the teeth of the gear 34 serves to lock the shaft 31 in the position last described and thereby locks the brake on the drum until released by the engineer.

I have shown the member 45 as connected to the safety devices above set forth and illustrated but it is evident that it may be used to perform other functions or operations contributing to the safety of the hoisting mechanism in case of a runaway. Thus it may be arranged to close the shaft doors.

For the sake of illustration I have shown my invention applied to a shaft mine in which a bucket is used as the hoisting receptacle. It is evident, however, that its usefulness is not confined to this or any other character of mining operation, as it may as readily be applied to drift or slope mining, or mines in which cages, skips or any character of receptacle is used. It is also applicable to elevators or other hoisting or draft mechanisms. I have illustrated my invention in connection with a well known type of hoisting engine but its applicability to any type of engine, or to other characters of power mechanisms, such as gas or explosive engines, compressed air motors, electric motors &c., is self evident.

What I desire to claim is:—

1. Draft mechanism, comprising controlling means, a receptacle, a draft cable attached to said receptacle, a safety device actuating member capable of bodily upward movement through which said cable passes and adapted to be engaged by said receptacle and cables supporting said member.

2. Draft mechanism comprising controlling means, a receptacle, a draft cable attached to said receptacle, a substantially annular member surrounding said cable, cables supporting said member and means whereby the engagement of said member by said receptacle actuates said controlling means.

3. Draft mechanism comprising controlling means, a receptacle, a draft cable attached to said receptacle, a member through which said cable passes, cables whereby said member is supported in place and means whereby the forcing upward of said member by said receptacle actuates said controlling means.

4. Draft mechanism comprising controlling means, a receptacle, a draft cable attached to said receptacle, a rotary rock shaft adapted to operate said controlling means, a member interposed in the path of said receptacle and adapted to be forced bodily upward thereby and an automatically detachable connection between said member and said rock shaft.

5. Draft mechanism comprising controlling means, a receptacle, a suspended member interposed in the path of said receptacle and adapted to be forced bodily upward thereby and an automatically detachable connection between said member and said controlling means.

6. Draft mechanism comprising controlling means, a receptacle, a draft cable attached to said receptacle, a rotary rock shaft adapted to operate said controlling means, a second rotary rock shaft in operative connection with said first rock shaft, a flexibly supported member capable of bodily upward movement interposed in the path of said receptacle and an operative connection between said member and said second rock shaft.

7. Draft mechanism comprising controlling means, a receptacle, a draft cable attached to said receptacle, a rotary rock shaft adapted to operate said controlling means, a second rotary rock shaft in operative connection with said first rock shaft, a flexibly supported member capable of bodily upward movement interposed in the path of said receptacle and an automatically detachable operative connection between said member and said second rock shaft.

Signed at Georgetown this 24th day of October 1907.

WILLIAM COOPER.

Witnesses:
M. SIDNEY,
ALLEN R. COMSTOCK.