

May 26, 1931.

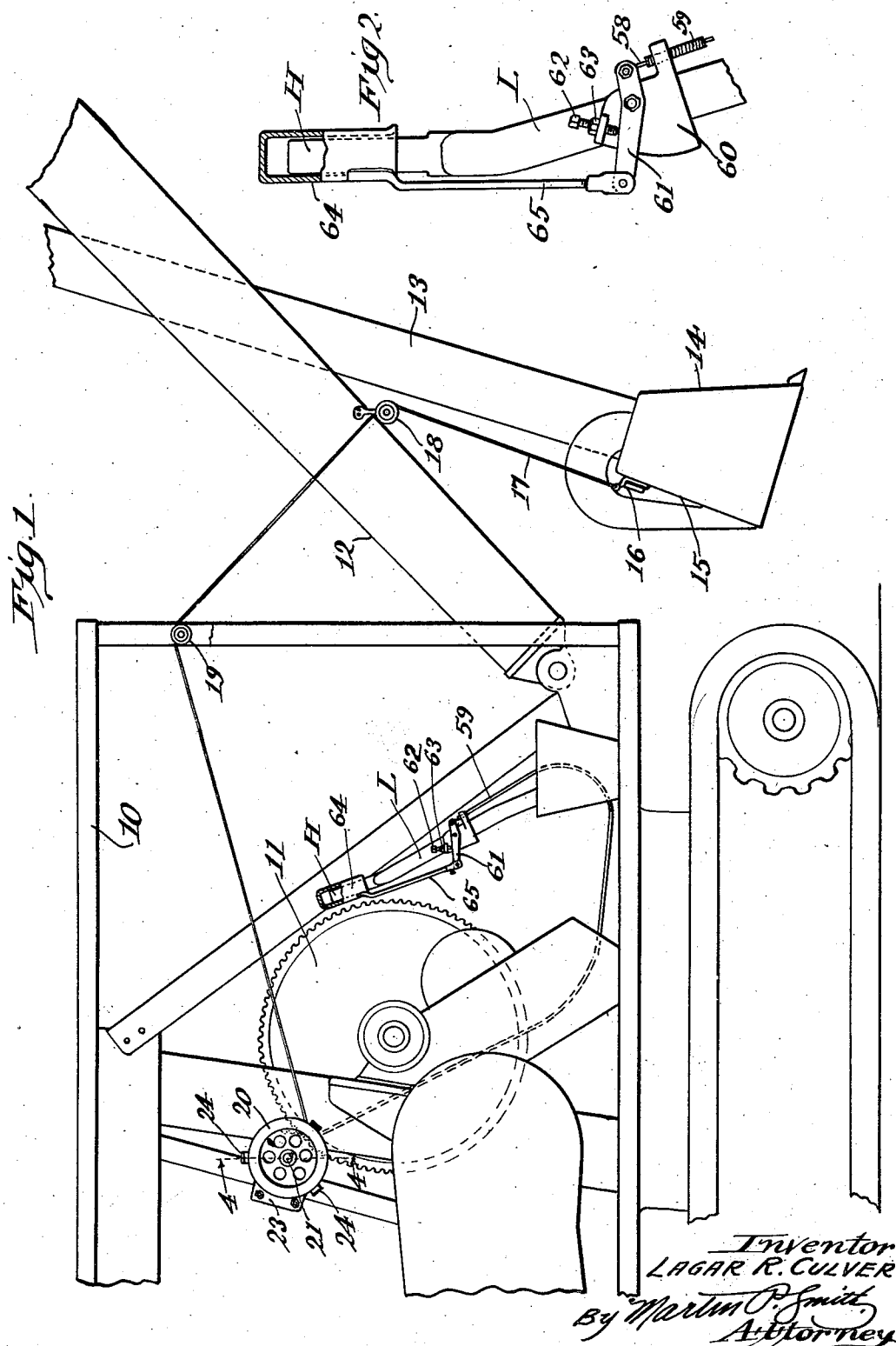
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1,807,028

POWER DIPPER DOOR LATCH TRIP

Filed July 16, 1929

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Fig. 3.

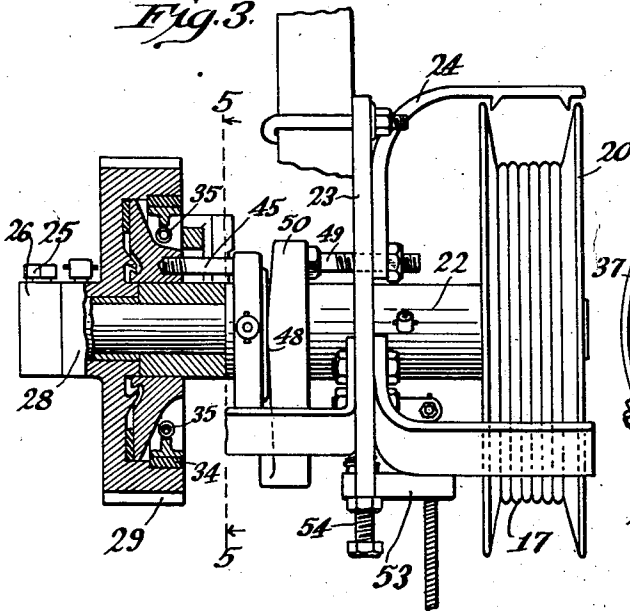


Fig. 5.

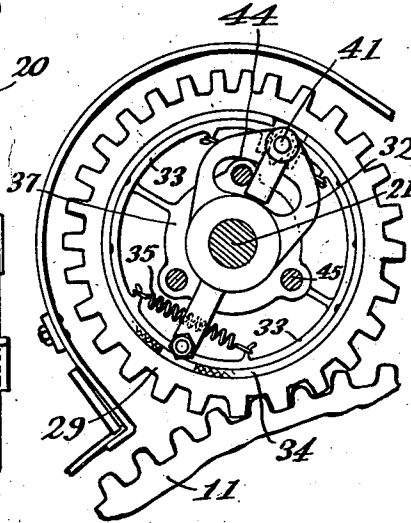
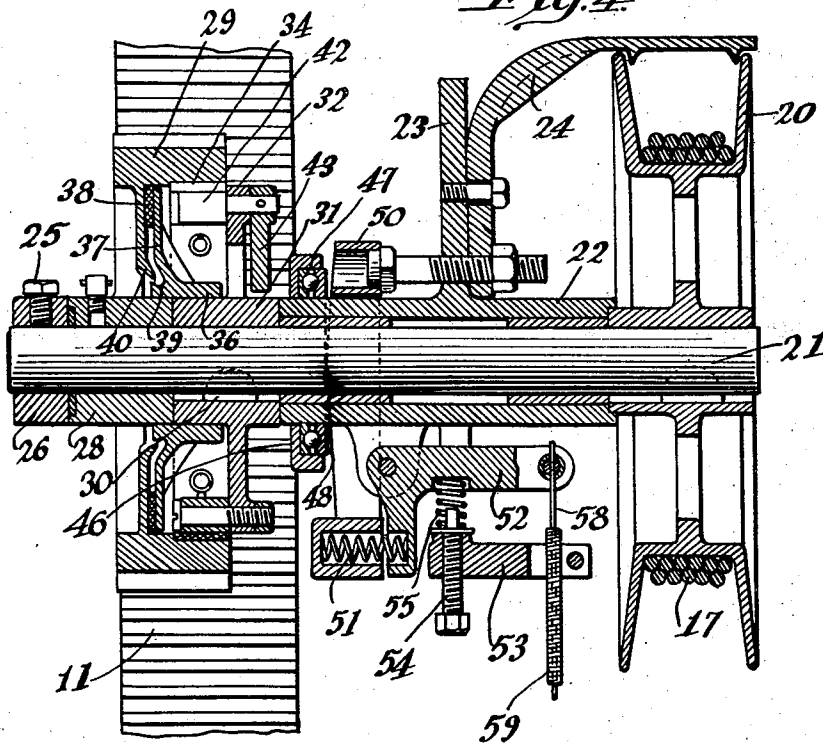


Fig. 4.



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POWER DIPPER DOOR LATCH TRIP

Application filed July 16, 1929. Serial No. 378,758.

My invention relates to a power dipper door latch trip and has for its principal object the provision of a relatively simple and practical device that may be conveniently associated with power shovels for tripping or releasing the latch that is utilized for holding the dipper door of the shovel in closed position.

My present invention is an improvement on the dipper door latch trips or releasing devices set forth in my copending applications for U. S. Letters Patent filed August 11th, 1928, Serial No. 299,058, and Serial No. 334,159 filed January 23rd, 1929.

Further objects of my invention are, to generally improve upon and simplify the construction of the dipper door latch trips disclosed in my aforesaid patent applications, to provide a latch tripping device that is capable of being readily applied to practically all makes of power shovels without altering the construction thereof or involving special machine work on the parts of the shovel, and further to provide a trip or latch releasing device that is relatively simple in construction, inexpensive of manufacture, strong and durable and positive and efficient in operation.

It is the present general practice to operate the dipper door latches of power shovels by means of a cable, a portion of which winds upon a drum or sheave and it is one of the objects of my invention to provide simple and efficient means that will at all times and under all conditions take up the slack in the latch releasing cable and at the same time permit the dipper to be manipulated while being filled without drawing the cable sufficiently taut to release the dipper door latch and it is a further object of my invention to provide means under control of the operator of the shovel for imparting rotary movement to the cable carrying drum or sheave whenever it is desired to exert sufficient pull on the cable to effect a withdrawal or release of the dipper door latch.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully de-

scribed and claimed and illustrated in the accompanying drawings, in which:

Fig. 1 is an elevational view of a power shovel and showing my improved dipper door latch release applied thereto.

Fig. 2 is an elevational view partly in section of thimble that is applied to one of the shovel control levers and which thimble, when manipulated, actuates the dipper door latch releasing means.

Fig. 3 is an elevational view partly in section of my improved dipper door latch releasing means.

Fig. 4 is an enlarged vertical section taken on the line 4—4 of Fig. 1.

Fig. 5 is a vertical cross section taken on the line 5—5 of Fig. 3.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates the cab of a power shovel, which cab encloses the engine and the greater portion of the operating parts of the shovel, including the main gear wheel 11, and projecting from the front of the cab is the boom 12 upon which is arranged for operation in the usual manner the dipper stick 13 and the latter carrying at its lower end a dipper 14 that is equipped with the usual drop door 15 and said door being retained in closed position by a latch 16.

Secured to the bolt of the latch 16 is one end of the latch releasing cable 17 that extends on suitably located pulleys 18 and 19, to a winding drum or sheave 20 that is rigidly fixed, preferably by means of a key to one end of a shaft 21.

Shaft 21 is mounted for rotation in a bearing 22, the latter being formed integral with a bracket or plate 23 and said bracket or plate being detachably mounted on one of the upright members of the frame or cab of the shovel.

Secured in any suitable manner to the bracket or plate 23 is a plurality of guard fingers 24, the outer ends of which project beyond the groove in the sheave 20 so as to retain within said groove that portion of the cable that winds unto the sheave.

Secured by means of a set screw 25 on the end of shaft 21 opposite to the end that car-

ries sheave 20 is a collar 26 and mounted for rotary movement upon shaft 21, immediately adjacent to the collar 26 is the hub 28 of a gear wheel or pinion 29 that meshes with the

5 main gear wheel 11.

Rigidly fixed in any suitable manner, preferably by means of a key 30 to shaft 21 adjacent to bushing 27 and the hub 28, is the hub portion 31 of a brake supporting arm 32. Carried by this arm 32 is a clutch 33, preferably of the type usually employed as expanding brakes on certain makes of automobiles and the parts of said clutch carry sections 34 of brake lining and which latter are adapted to engage the adjacent inner face of the rim of gear wheel 29.

15 The parts of the clutch 33 are normally drawn toward each other out of frictional engagement with the gear wheel by retractile springs 35.

Mounted to move freely upon the hub 31 of the brake supporting arm 32 and upon the hub 28 of the gear wheel 29 is the hub portion 36 of a friction plate 37, which latter lies between the clutch 33 and the web of the gear wheel 29 and arranged between the outer portion of this friction plate and the web of the gear wheel is a friction ring 38 of asbestos or analogous material.

20 Formed in the outer face of the friction plate 37 near the hub is circumferential groove 39 into which projects flange 40 on the web of the gear wheel 29 and which construction provides a trap for the collection of liquid lubricant and preventing the same from flowing outwardly between the friction plate and web of the gear wheel into contact with the friction ring 38.

30 Journaled in one end of the clutch supporting arm 32 is a short pin or shaft 41 and mounted on the inner end thereof is a cam or eccentric 42 that is positioned between the inturned ends of the two parts of the clutch 33 and which construction is common in automobile brakes.

45 Secured to the outer end of shaft 41 is a short crank arm 43 that projects inwardly toward the shaft 21.

Formed in the brake supporting arm 32 between the bearing for the shaft 41 and the hub 31 is a short arcuate slot 44 that is concentric with the axis of shaft 21.

50 Seated in friction plate 37 are the inner ends of three or more pins 45, one of which projects through slot 44 to the side of the crank arm 43 and the outer ends of these pins 45 are seated in a thrust ring 46 that is loosely mounted on bearing 22 and which thrust ring carries a series of antifriction bearing members 47 against which engages an outer face plate 48.

55 Seated in the bracket 23 directly above the bearing 22 is a pin or stud 49 and fulcrumed on the outer end thereof is the upper end of a yoke 50 that extends downwardly to

the sides of the bearing 22 and seated in a recess in the lower end of this yoke is an expansive coil spring 51.

Fulcrumed on a bracket that depends from the underside of bearing 22 is a bell crank lever 52, the short vertical arm of which bears against the outer end of the spring 51. Seated in a bracket 53 that depends from the underside of bearing 22 is a screw 54, the upper end of which bears against the lower end of an expansive coil spring 55 and the upper end of the latter bears against the under side of the horizontal arm of the bell crank lever 52.

60 Secured in any suitable manner to the outer end of lever 52 is one end of a flexible member 58, such as a piano wire, and this flexible member extends through a flexible conduit 59, preferably of metal, one end of which is clamped in any suitable manner to bracket 53 at a point just below the end of lever 52.

65 Secured in any suitable manner to one of the hand levers L that control the operation of the shovel at a point a short distance below the handle H at the top of said lever is a bracket 60, on the side of which is fulcrumed a lever 61 and connected in any suitable manner to the forward end of the lever is the end of the flexible member 58 that projects from the corresponding end of the flexible conduit 59, the latter being secured to bracket 60 in any suitable manner.

Mounted upon the upper portion of bracket 60, above the rear portion of lever 61 is a set screw 62 upon which is located a lock-nut 63 and which screw may be adjusted and locked in its adjusted position so as to limit the upward swinging movement of the rear portion of lever 61.

70 Mounted to slide freely upon the handle H of lever L is a tubular housing or thimble 64, and depending therefrom is an arm 65, the lower end of which is pivotally connected to the rear end of lever 61.

Under normal conditions or while the shovel is in operation gear wheel 29 rotates continuously inasmuch as it is in mesh with the main drum gear 11 of the shovel, but until the latch releasing mechanism is actuated as hereinafter described, shaft 21, to which sheave 20 and clutch supporting arm 32 are keyed, will not rotate.

75 Springs 35 normally hold clutch 33 and its lining 34 out of frictional engagement with the inner face of gear wheel 29 and the tension of spring 51 is sufficient to act through yoke 50, thrust bearing 46 and pins 45 to force friction disc 37 and the ring 38 against the web of gear wheel 29 to a sufficient degree so as to rotate shaft 21 and sheave 20, thereby winding the cable 17 unto the sheave so as to normally take up the slack in said cable, but the contact of friction disc 37 with the web of gear wheel 29, as just

described is not sufficient to exert pulling strains upon the cable that would withdraw or trip the dipper latch.

sufficient pull to release the dipper door latch, thereby accomplishing the desired result.

Spring 55 between the bell crank lever 52 and adjusting screw 54 is for the purpose of retracting or exerting reverse pull on the flexible member 58 and return the thimble 64 and parts associated therewith to their normal positions as the dipper door latch has been tripped as just described.

Bolt 49 is adjustable in its support so as to regulate the position of yoke 50 and its fulcrum.

Thus it will be seen that I have provided relatively simple, practical and inexpensive means that is under control of the operator of the power shovel for releasing the dipper door latch so as to permit the door to open and discharge the contents of the dipper and which releasing means is strong and durable in structure and capable of being readily applied to practically all forms of power shovels without special machine work on the shovel structure or the provision of special castings or extraneous parts.

An especially desirable feature of my invention is the mounting of the cable winding sheave or drum 20 upon a shaft that is not constantly rotated directly from the main drum gear of the shovel and in this connection it will be understood that the drum carrying shaft 21 is not rotated until sufficient friction has been developed between the clutch supporting arm that is keyed to said shaft and the gear wheel 29 that is mounted for rotary movement upon the shaft that carries the sheave. Gear wheel 29 rotates constantly by its engagement with the main drum gear of the shovel whereas shaft 21 that functions as a support for the gear wheel and which carries sheave 20 rotates only periodically.

It will be understood that minor changes in the size, form and construction of the various parts of my improved power dipper door latch trip may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a power dipper door latch releasing device, a shaft, a winding drum secured to said shaft, a cable secured to and adapted to wind unto said drum, which cable is connected to the dipper door latch of the shovel with which the device is associated, a constantly rotating gear wheel mounted for rotation upon said shaft, a friction disc adapted to engage said gear wheel, a supporting arm secured to said shaft, a clutch carried by said supporting arm for engaging the gear wheel and means carried by said friction disc for actuating said clutch, said friction disc, clutch and clutch actuating means providing a slip drive connection between said shaft and gear wheel, whereby said shaft

The normal friction between disc 37 and gear wheel 29 will cause said disc to tend to revolve with gear wheel 29, but as one of the pins 45 is in contact with lever 43 that actuates the brake band within the gear wheel, the tendency would be to move this lever, but as a greater degree of frictional resistance is required by the disc 37 and the web of gear wheel 29, together with the resistance offered by cable 17, to overcome the tension of springs 35, the tendency will be to revolve the brake supporting arm 42 which is keyed to shaft 21 and as sheave 20 is also keyed to shaft 21 it will revolve with gear wheel 29 as long as the tension on the cable 17 is not sufficient to cause a slippage between disc 37 and the web of gear wheel 29.

When the proper tension, as determined by the position of bell crank lever 52, on cable 17 is reached, there will be a slippage between frictional disc 37 and gear wheel 29 and if the dipper is drawn inward the friction between disc 37 and gear wheel 29 will immediately rotate shaft 21 and sheave 20 so as to wind the cable unto said sheave and take up the slack therein.

Likewise as the dipper is moved outwardly the cable will be unwound from the sheave 20 and placed out under the proper tension without slack.

The tension of spring 51 determines the degree of frictional resistance between disc 37 and gear wheel 29 and the tension of this spring is adjusted by changing the position of the bell crank lever 52 and which latter is adjusted by means of screw 54.

To trip or release the dipper door latch, thimble 64 is pressed downward upon handle H, thereby rocking lever 61 and drawing flexible member 58 through the flexible conduit 59 so as to pull down upon the long arm of bell crank lever 62 and as the latter is swung upon its fulcrum it will act upon the lower end of yoke 50 to swing the same upon its fulcrum (the bolt 49) and the intermediate portion of the yoke will bear on thrust bearing 46 and through pins 45 the friction disc 37 will be moved into frictional engagement with the web of gear wheel 29, which is constantly rotating.

As the friction disc 37 is, through its frictional engagement with the gear wheel, picked up and rotated the pin 45 that is in engagement with crank arm 43 will swing said arm a short distance, thereby rocking shaft 41 to expand the clutch and force the same into frictional engagement with gear wheel 29, with the result that the clutch supporting arm 42 will rotate positively and without slippage and as a result sheave 20 will be rotated so as to wind cable 17 thereunto and exert

tends to rotate so as to wind the cable on the drum carried thereby and maintain said cable under a tension insufficient to withdraw the latch.

2. In a power dipper door latch releasing device, a shaft, a winding drum secured to said shaft, a cable secured to and adapted to wind unto said drum, which cable is connected to the dipper door latch of the shovel with which the device is associated, a constantly rotating gear wheel mounted for rotation upon said shaft, a friction disc adapted to engage said gear wheel, a supporting arm secured to said shaft, a clutch carried by said supporting arm for engaging the gear wheel, means carried by said friction disc for actuating said clutch, said friction disc, clutch and clutch actuating means providing a slip drive connection between said shaft and gear wheel, whereby said shaft tends to rotate so as to wind the cable on the drum carried thereby and maintain said cable under a tension insufficient to withdraw the latch, and manually operable means for producing greater frictional engagement between the shaft and gear wheel, whereby sufficient tension is applied to the cable to release the door latch.

3. The combination with a power shovel and the latch of the dipper door associated therewith, of a trip cable connected to said latch, a drum on which said cable is wound, a shaft upon which said drum is rigidly fixed and means including a constantly rotating gear wheel that is loosely mounted on said shaft for rotating the latter and the drum, a friction disc for engaging the gear wheel, an arm fixed to the shaft, a clutch supported by said arm for engaging said gear wheel, means carried by the friction disc for actuating said clutch, which friction disc clutch and clutch actuating member provide means for automatically taking up the slack in said cable, but not sufficiently to positively actuate the cable to release the door latch.

4. The combination with a power shovel and the latch of the dipper door associated therewith, of a trip cable connected to said latch, a drum on which said cable is wound, a shaft upon which said drum is rigidly fixed, means including a constantly rotating gear wheel that is loosely mounted on said shaft for rotating the latter and the drum, a friction disc for engaging the gear wheel, an arm fixed to the shaft, a clutch supported by said arm for engaging said gear wheel, means carried by the friction disc for actuating said clutch, which friction disc clutch and clutch actuating member provide means for automatically taking up the slack in said cable, but not sufficiently to positively actuate the cable to release the door latch and manually actuated means for effecting a positive rotation of said shaft and the drum car-

ried thereby to wind the cable unto said drum and trip the dipper door latch.

5. The combination with a power shovel and the latch of the dipper door associated therewith, of a trip cable connected to said latch, a drum on which said cable is wound, a shaft upon which said drum is rigidly fixed, means including a constantly rotating gear wheel that is loosely mounted on said shaft for rotating the latter and the drum, a friction disc for engaging the gear wheel, an arm fixed to the shaft, a clutch supported by said arm for engaging said gear wheel, means carried by the friction disc for actuating said clutch, which friction disc clutch and clutch actuating member provide means for automatically taking up the slack in said cable, but not sufficiently to positively actuate the cable to release the door latch, manually actuated means for effecting a positive rotation of said shaft and the drum carried thereby to wind the cable unto said drum and trip the dipper door latch and a portion of which manually actuated means is adjustable in order to control the rotary movement imparted to said shaft and the winding drum carried thereby.

6. In a power dipper door latch release, a shaft, a winding drum secured thereto, a cable secured to and adapted to wind unto said drum, which cable is connected to the latch of the dipper door of the shovel to which the device is applied, a gear wheel loosely mounted on the shaft, which gear wheel is adapted to mesh with a constantly rotating gear on the shovel, a support secured to the shaft, a clutch carried by said support and adapted to engage said gear wheel, means for actuating said clutch to produce a limited degree of frictional engagement between the clutch and said gear wheel and manually operable means for increasing the degree of frictional resistance between said shaft and gear wheel so as to rotate said shaft and the cable receiving drum carried thereby.

7. In a power dipper door latch releasing device, a shaft, a drum secured thereto, a dipper door latch releasing cable secured to and adapted to wind unto said drum, a gear wheel loosely mounted on said shaft, which gear wheel is adapted to mesh with a constantly rotating gear wheel on the power shovel with which the device is associated, a loosely mounted friction disc adapted to engage said gear wheel, a support fixed to said shaft, a clutch carried by said support and adapted to engage said gear wheel, means carried by said friction disc for causing said clutch to engage said gear wheel and manually actuated means for effecting a positive driving engagement between said gear wheel and shaft.

8. In a dipper door latch releasing device, a shaft, a drum secured thereto, a dipper door latch releasing cable secured to and adapted

to wind unto said drum, a constantly driven member mounted for rotation on said shaft, a supporting member fixed to the shaft, a clutch carried by said supporting member and adapted to engage said constantly driven member, a loosely mounted manually controlled member adapted to frictionally engage said gear wheel and means carried by said last mentioned member for causing said clutch to engage said constantly driven member.

9. In a dipper door latch releasing device, a shaft, a drum secured thereto, a dipper door latch releasing cable secured to and adapted to wind unto said drum, a constantly driven member mounted for rotation on said shaft, a supporting member fixed to the shaft, a clutch carried by said supporting member and adapted to engage said constantly driven member, a loosely mounted manually controlled member adapted to frictionally engage said gear wheel and means carried by said last mentioned member for causing said clutch to engage said constantly driven member and separate means for effecting a positive driving engagement between said constantly driven member and said shaft.

10. In a dipper door latch releasing device, a shaft, a drum secured thereto, a dipper door latch releasing cable secured to one adapted to wind unto said drum, a constantly driven member mounted for rotation on said shaft, a supporting member fixed to the shaft, a clutch carried by said supporting member and adapted to engage said constantly driven member, a loosely mounted manually controlled member adapted to frictionally engage said gear wheel and means carried by said last mentioned member for causing said clutch to engage said constantly driven member, separate means for effecting a positive driving engagement between said constantly driven member and said shaft and manually operable means for actuating said last mentioned means.

In testimony whereof I affix my signature.
LAGAR R. CULVER.

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