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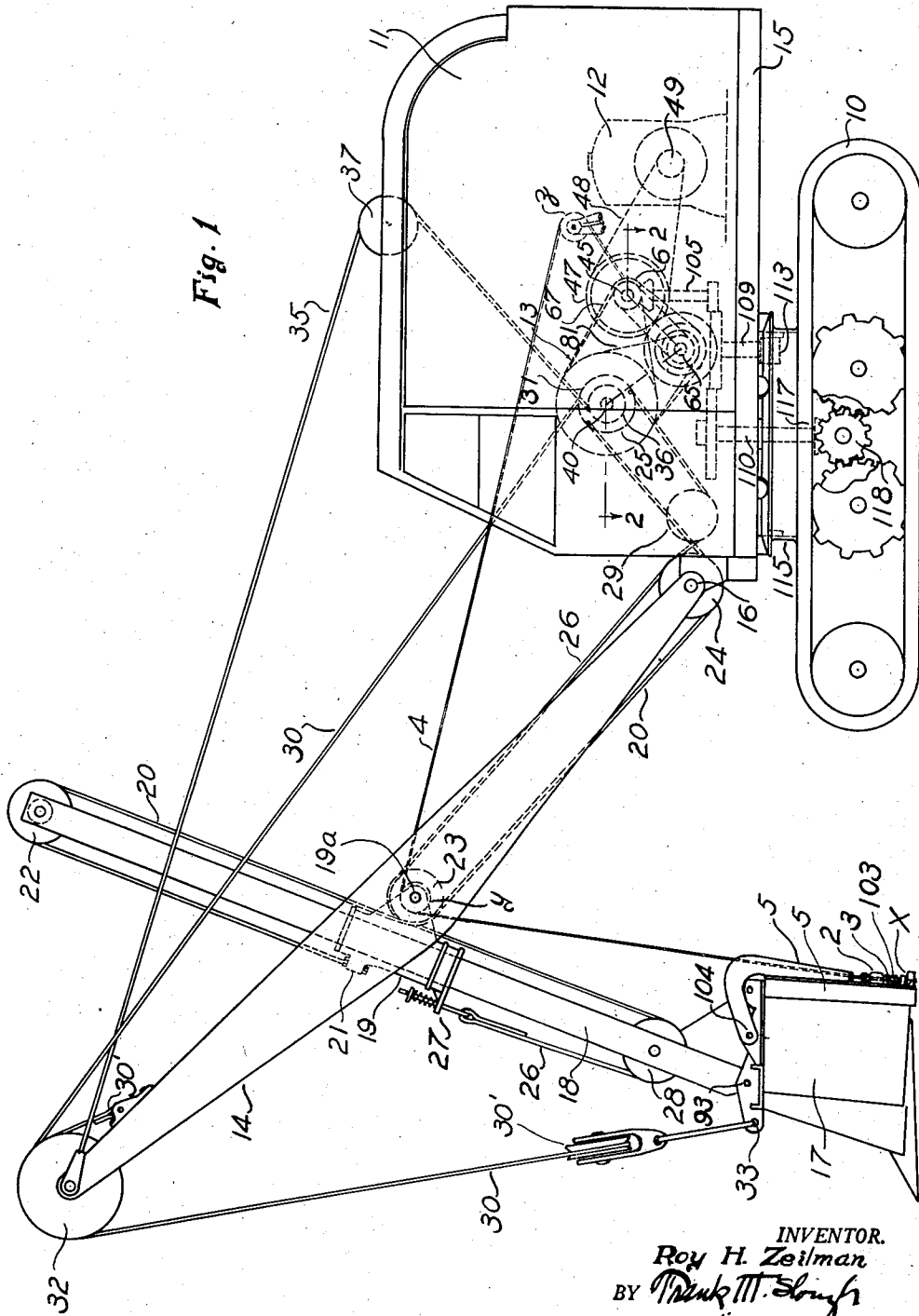
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LINE TAKE-UP FOR POWER SHOVELS, CRANES AND THE LIKE

Filed Feb. 19, 1944

2 Sheets-Sheet 1



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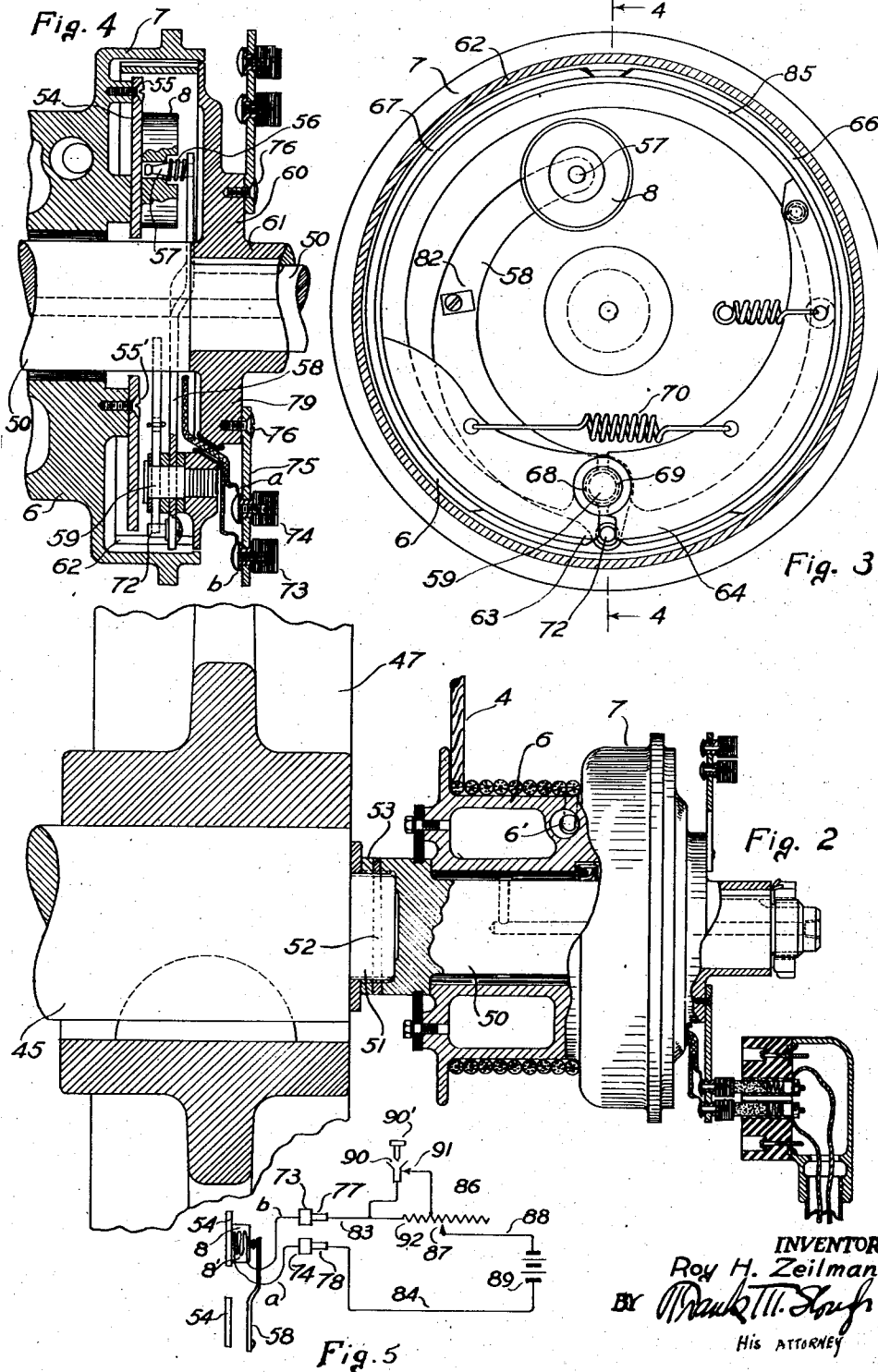
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UNITED STATES PATENT OFFICE

2,385,906

LINE TAKE-UP FOR POWER SHOVELS,
CRANES, AND THE LIKERoy H. Zellman, Lorain, Ohio, assignor to The
Thew Shovel Company, Lorain, Ohio, a corpo-
ration of Ohio

Application February 19, 1944, Serial No. 523,143

7 Claims. (Cl. 214-146)

This invention relates to controlling mechanisms for power operated shovel dipper latch lines and like lines for mobile power shovel or crane mechanisms, more particularly for maintaining such lines sufficiently taut as to eliminate unnecessary slack therein during certain periods of operation of said mobile mechanisms, or in the case of latch lines when said lines are not in actual use for performing the ultimate functional purpose for which said lines are commonly provided, and to achieve performance of said ultimate line function when desired by the operator to be performed.

Latch lines and tag lines for power excavating and load handling apparatus such as power shovels and cranes commonly extend from the turntable of power cranes and shovels to the excavating apparatus carried by the boom, and during portions of the periods when said apparatus is in operation frequently slack off, as when the boom carrying the shovel or bucket is moved to a relatively more elevated position or upon retraction of a shovel dipper stick, and such dangling lines sometimes become entangled with various of the boom carried parts or with extraneous objects or become displaced from sheaves, and much time is lost in remedying the situation.

Through the provision of my improved mechanism comprising an improved reeling means for yieldably exerting a winding effort upon the drum, the line is kept substantially taut, said means adapted to yield to permit a greater length of line to be unwound from the line drum according to the line drawing movements of the boom or shovel bucket.

In addition to maintaining the said line substantially taut, I provide improved controlling means for line winding means for power shovels, whereby a greater winding effort is imposed upon the winding drum to produce a sufficiently strong operating pull on the line to cause it to perform its primary function, i. e., to operate a dipper latch.

More especially, an object of my invention is to provide improved variably yieldable mechanism for exerting a winding effort upon the winding drum for a line of the above character under the control of variably adjustable means to vary the power of said winding effort.

Another object of my invention is to more efficiently accomplish the foregoing object through the instrumentality of a manually variably energizable electro-magnetic clutch.

Another object of my invention is to provide improved simple and efficient mechanism which

may be readily applied to power machines and which may be simply and quickly operated.

The invention will be better understood by those skilled in the art to which my invention appertains by reference to the following drawings and to the specification and description of the embodiment thereof illustrated in the said drawings, wherein:

Fig. 1 is a side elevational view of a power shovel mechanism and the dipper dump bottom retained latch together with the latch line for operating said latch and apparatus enclosed by the turntable supported cab indicated therein by dotted lines;

Fig. 2 is a view, partially in section and partially in elevation, of a power shaft end carrying a pulley and a clutch and line winding mechanism attached to said shaft end;

Fig. 3 is an end elevational view of the electro-mechanical clutch apparatus disposed within the clutch casing of Fig. 2;

Fig. 4 is a transverse section taken on the diameter 4-4 of Fig. 3; and

Fig. 5 is a diagrammatic view of the electrical system comprising as an element thereof the electro-magnet of said electro-magnetic clutch, illustrated in Figs. 3 and 4.

Referring now first to the drawings of Fig. 1, there is illustrated therein a power shovel of the self-propelled type employing an endless track 10 driven through suitable gearing comprising a driving pinion 118, bevelled gear 117, a travel shaft 110 and suitable transmission means within the cab comprising a series of intermeshed gears, shown by dotted lines, and including the shaft 105.

At 45 is shown a power transmission shaft which is adapted to be rotated by power from the engine 12 delivered through engine pulley 49 and belt 48 to the pulley 47, a fragment of the said pulley 47 being also illustrated in Fig. 2.

Although my invention may be applied to many and various arrangements for operating the boom and the dipper to perform the usual power shovel functions, I have chosen to illustrate my invention as being applied to a power shovel of the type of my co-pending application, Serial No. 502,354, filed September 14, 1943.

Briefly described, the more important parts of the power shovel structure, aside from the foregoing, are the drum shaft 40 carrying the drums 25, 31 and 36, the same being interchangeably operated under the control of the usual operator's control levers, not shown but well understood, and the supplemental driving shaft 65, there

being suitable transmission means involving chains or belts, such as shown at 13 and 67, so interconnecting clutches, gears, sprockets and the like on the several shafts whereby the various power shovel operations may be expeditiously performed.

The winding drum 36 on the shaft 40 is for the purpose of elevating or lowering the boom 14 through the cable 35 having an end secured to the end of the boom, thence passing over the sheave 37, its other end being wound upon said drum 36.

Another cable 30 has a similar winding relationship with a drum 31 carried upon the same shaft 40, as the drum 36, and is passed over one of a pair of sheaves 32 at the end of the boom, thence through a sheave 30' attached to portion 33 of the dipper 17, and thence rearwardly over a twin sheave of the character of 32 rearwardly to a fixed connection with the boom as at 30' at a point rearwardly of said twin sheaves, whereby the dipper 17, by a lifting effort at 33 exerted by the cable 30, may be tilted to dispose its dump bottom 5 lowermost.

Cables 20 and 26 having corresponding ends relatively reversely wound upon the same, a drum 25 are passed over suitable sheaves such as 23, 24 and 29, with the line 20 passed over the sheave 22 and the line 26 passed over the sheave 28, the ends being then secured at 21 and 27 to a medial portion 19 of the dipper stick 18.

The latch construction per se, indicated at "x," is old its construction, as shown, being that of the conventional type commonly employed to removably retain the bucket dump bottom 5 in closed position with respect to the engaged end walls of said dipper.

While I have above briefly referred to some of the various parts of the power shovel and operating cables therefor, the present invention deals chiefly with the problem of maintaining the latch line 4 substantially taut during all operative periods, achieved, generally speaking, by a constantly exerted relatively weak pulling effort upon that end of the line 4 which extends within the cab 11 and which is wound upon the line reeling drum 6, best illustrated in Fig. 2, which constantly tends to rotate in the winding direction through the application of a weak winding effort constantly applied thereto through the instrumentality of the magnetic clutch apparatus disposed within the magnetic casing 7, Figs. 2 to 4 inclusive, such apparatus being best illustrated in Figs. 3 and 4.

The operation of the electro-magnetic clutch mechanism is controlled by variations of the strength of the current flow passing through the electromagnet 8 by suitable adjustment of the electric current flow controller mechanism, generally indicated at 9, Fig. 5.

My invention may be embodied in connection with other electrical clutch constructions other than that illustrated in the drawings, said drawings illustrating one form of clutch construction which I have found suitable for adaptation to the performance of the functions required in the practice of my present invention is generally of the design employed for electromagnetic brakes for industrial machinery and vehicle wheels, as illustrated in U. S. Letters Patent No. 2,273,065 to W. R. Penrose, dated February 17, 1942.

Other magnetic clutch constructions such as that disclosed in U. S. Letters Patent No.

817,210 to H. A. Williams, dated April 10, 1906, may also be suitably employed.

Inasmuch as the apparatus illustrated in the said Penrose patent is very completely described therein, the said description thereof is hereby incorporated in the present specification by reference and a brief description thereof will suffice for incorporation here.

Briefly described and with reference to the adaptation of the brake mechanism of said patent to the application of the latch line winding drum 6, it will be understood that the shaft 45, Fig. 2, is the main power shaft of the power shovel, being driven during shovel operating periods through the belt 48 from the pulley 49 carried on the crank shaft of the engine 12 and that, although the clutch and drum spindle 50 may be power connected to the shaft 45 in a number of different ways in order to achieve rotation of the spindle by power supplied by the engine, and more to achieve the further purpose of enabling my invention to be applied to existing power shovels or cranes, said spindle 50 is fixedly mounted on the reduced end 51 of the shaft 45 either by screw threading the same on said shaft end, as illustrated, with a pin 52 passing through the relatively telescoped ends 51 of the power shaft and 53 of the spindle, or in any other suitable manner.

The drum with the integrally formed clutch casing 7 being journaled for relative rotation upon the spindle 50, the clutch mechanism disposed within the casing 7 is provided to frictionally communicate power from the shaft 45 and spindle 50 to the drum 6 to cause said drum to tend to rotate in such a direction as to exert a pull upon the latch line 4, whose end portion is wound upon said drum and whose extreme end is anchored thereto, as at 6'.

To accomplish this purpose, an annular plate 54 is secured, as at 55 and 55', to the integral unit comprising the drum 6 and the clutch casing 7. An electro-magnet 8, preferably of the iron-clad type is positioned to bear against the surface of the plate 54 by the small amount of pressure exerted by the spring 56 encircling the finger 57 which projects within the central bore of the body of the electro-magnet 8 which is preferably annular in form, said finger 57 being carried upon the laterally deflectible curved arm 58, which is fulcrumed upon a headed pivot pin 59 whose threaded end is secured to a rotating backing plate 60 by its hub 61 which is splined upon the clutch spindle 50.

The lever pivot pin 59 and the iron-clad electro-magnet 8 are disposed on the opposite sides of the axis of the spindle upon which the drum and clutch casing are adapted to rotate.

A clutch shoe 62 of the single band type having separable operating ends 63 and 64 which include upright reinforcing members extending oppositely for a portion of the circumference of the clutch band member 85 is arranged within the clutch casing 7. In retracted position, the ends 63 and 64 engage the anchor pin 59 which serves as a hanger therefor.

A lining of the character of brake lining is affixed to the outer surface of the band member 85 to provide primary and secondary portions 66 and 67.

The separable operating ends 63 and 64 are shaped as at 68 and 69 respectively to permit of retraction about the anchor pin 59 and to assist in retaining the clutch shoe 62 in proper relation axially of the clutch casing. Coiled

spring 70 provides tension between the operating ends of the clutch shoe 62 for holding the brake in retracted position, as shown in Fig. 3.

The actuating means for controllably and variably applying the clutch shoe in clutching engagement with the inner cylindrical surface of the clutch casing 7 comprises the electro-magnet 8, the magnet supporting curved arm 58 journaled on the pin 59 and the annular flat faced disc plate 54 secured at 55' to the inner wall of the clutch casing. The lever 58 swings about the fixed pivot 59 and comprises the curved long arm which is offset to pass around the spindle 50, the electro-magnet being disposed at a point substantially more than 90° from the pivot pin and comprises also a short arm 71 which carries a pin 72 which extends between the said separable operating ends of the clutch shoe 62.

The pin 72 adjacent the free end of the short arm 71 of the lever 58 is arranged with its axis disposed parallel with the axis of the lever pivot pin 59 but is slightly offset laterally from that vertical plane which includes the drum and lever pivot axes. In this way, changes in the effective length of the short arm are minimized during lever movement as the pin 72 engages either one of the separable operating ends of the clutch shoe.

It will be understood from the foregoing description that the clutch shoe, and primary and secondary lining portions 66 and 67 will be applied upon controllably energizing the winding of the electro-magnet, as diagrammatically shown in Fig. 5.

When the winding is so energized at any current strength up to a practical maximum, force is derived continuously and substantially without variation from the torque of the rotating drum by electro-magnetically induced friction between the electro-magnet and the magnetizable annular plate 54.

In the embodiment illustrated, the direction of rotation imposed by the power shaft 45 and spindle 50 to the curved arm 58 and electro-magnet 8 is such as to preferably make the clutch action non-self-energizable and in the operation of the mechanism as adapted for the purpose of my present invention, all rotative magnetic drag efforts imposed upon the winding drum portion 6 of the integral unit 6—7 is in the same direction of rotation.

Since during operation of the mechanism of the power shovel or crane, the drive shaft 45, the spindle 50 and therefore the annular plate 60, which is keyed onto the reduced end of the spindle 50, are all continuously rotated, and since the electro-magnet is secured by the anchor pin 52 to said annular disc 60, electrical conducting slip rings 73 and 74 carried on an annular disc 75 rigidly secured, as at 76, to the disc 60 and rotatable with it, are employed in association with the brushes 77 and 78 to convey energizing electrical current through said brushes and the slip rings frictionally contacted by the brushes, and circuit conductors *a* and *b* to the electro-magnet, said circuit conductors entering the clutch casing through an aperture 79 through the plate 60 and leading therefrom to the winding of the electro-magnet 8.

The circuit conductors *a* are of the well known braided wire type with a rubber or other well known cover insulation whereby to withstand the sliding flexing movements of the electro-magnet 8 and its carrying arm 58, to which carrying arm

said conductors are conveniently secured within the casing.

A clamp such as that shown at 82 is employed to clamp the wires *a* and *b* to the arm 58, although the wires themselves from the point of their entrance within the interior of the clutch casing are not actually shown to avoid complexities of illustration, it will, however, be understood that said conductors *a* and *b* entering the casing at 79 interconnect the slip rings 73 and 74 to the winding of the iron-clad electro-magnet 8 and that their position in the casing is substantially parallel to the curved arm 58, being preferably secured thereto, as at 82.

It will be understood that the annular metal plate 54, which is rigidly carried by the casing will be of magnetic iron or steel of good magnetic armature quality and that at least the face thereof which is frictionally engageable with the flat face of the electro-magnet 8 will be flat so as to make intimate contact with the face of the magnet and durable to withstand normal sliding contact by the magnet face over the said surface without undue wear of said plate. Preferably, the iron material of the magnet face will be the softer, for reasons of more ready replacement at lower cost.

The electrical circuit for effecting operation of the clutch mechanism for the winding drum 6 is shown in Fig. 5 wherein diagrammatically the electro-magnet 8 having a winding 8' is shown in frictional abutting contact with the annular plate 54 carried by the winding drum and circuit conductors *a* and *b*, leading therefrom to the slip rings 73 and 74 which, in turn, are frictionally contacted by the conductor brushes 77 and 78 respectively, from which brushes circuit conductor 83 leading to a rheostat resistance 86 which, in turn, is contacted by an adjustably movable plate 87 to include more or less of the resistance 86 in the circuit conductor 88 leading from said plate to a storage battery or other source 89 of preferably direct current, the other pole of said battery being connected to the circuit conductor 84.

A push button switch 90 having normally open contacts 91 bridges a section 92 of the resistance in the resistance unit 86. Assuming that the push mechanism is in operation and that by operation thereof, the dipper 17 has been supplied with excavating material and by virtue of the operation of the cables 30, the dipper 17 is rotated clockwise about its pivotal support 93 to place the dump bottom or door 5 lowermost, the apparatus of my invention will then be operated to withdraw the latch bolt 3 from the latch plate *x*.

To condition the apparatus for operation, the adjustable rheostat blade 87 is moved over the resistance portion disposed to the right of the intermediate connection leading to a contact of the switch 90 until the flow of current from the source 89 to the magnet 8 is sufficient to maintain the latch line 4 sufficiently taut while not exerting such a pull thereon as to unlatch the dipper bottom 5. At such a time, the electro-magnet 8 being relatively weakly magnetized will nevertheless exert a substantial rotative drag on the armature disc 50 and therefore, upon the latch line winding drum 6 to tend to wind the line upon the drum but the tractive effort will be insufficiently strong to do more than to take the undesirable slack out of the line but being not of sufficient strength to overcome the opposing force of the spring 3 holding the latched bolt in latched position.

The dipper load, being as aforesaid ready to be dumped, the operator then will press the button 90' of the push button switch 90 and close the contacts 91 whereupon the magnet 8 will receive much more current and be much more strongly magnetized and will exert a definite relatively strong rotative pull on the armature disc 54, and resultantly, a relatively strong winding effort upon the drum 6 which, being communicated to the line 4, will cause the bolt 3 to be withdrawn from latched position against the power of the spring 103 and the bottom will swing outwardly about its hinge 104 to dump the load.

After the dumping operation, the push button 90' being released, the circuit is restored to its former condition of providing a weak current through the magnet 8 merely to maintain the line taut and the bottom dump door of the dipper being restored by gravity when the dipper is again swung to such a position as illustrated in Fig. 1 or otherwise, said bottom is restored, the spring 103 will ensure that the latch is again operative to latch the bottom dump door.

Having hereinabove described my invention as applied to the latch line for the dipper latch of a power shovel, as previously stated, my invention has a useful application to other lines, such as tag lines, extending rearwardly from a crane bucket in such a manner as to exert a pull on the bucket in a direction at an angle to the lines for operating said bucket in order that said line exerting a pull on said bucket may prevent the bucket from rotating when suspended from the end of the crane boom.

Such tag lines have long been commonly employed in the art, their application to the bucket being well known and understood, and the same is not illustrated herein but, for the purpose of the present disclosure, reference may be had to U. S. Letters Patent No. 2,166,479, to Ruddock dated July 18, 1939, which discloses such a tag line applied to a clam shell type of crane bucket, and which, incidentally, illustrates one prior attempt to maintain such tag line taut. The disclosure of the above patent is to be referred to only as illustrating the nature of such tag line and one method of attachment thereof to an excavating clam shell bucket for a crane.

Such a line is passed rearwardly to the cab in some such manner as that illustrated for the latch line of the previously described embodiment of my invention and the arrangement previously described comprises the winding drum for such a line and the inter-related mechanical friction clutch and electro-magnetic clutch will, for the purpose of this disclosure, be considered as being duplicated for such tag line of a crane bucket.

The present invention provides improved means for maintaining the line taut in a more efficient manner and under a greater range of boom and clam shell movements.

With such crane tag line interconnecting a rearwardly extending portion of the bucket and such a winding drum, as previously described, the current flow through the electro-magnet is, as in the former case, suitably reduced by a resistance interposed between the source of current and the magnet of the electro-magnetic clutch to ensure that a sufficient and inextensible pull is exerted upon said tag line to prevent undue rotation or rotative oscillation of the bucket during such times as when carrying a load of excavating material, freely pendant from the end of the boom and perhaps, being swung

laterally or forwardly and rearwardly at the same time.

Under such a condition, the drum will pay out sufficient of the tag line depending upon the pendant condition of the bucket under different adjusted positions of the bucket and the disposition of the boom and will reel in excess line and maintain the line sufficiently taut at all times.

The present invention is also in proper size and power applicable to any or all of the clutch mechanisms commonly employed in power shovels or cranes illustrated in the co-pending application of Zeilman and Smythe, Serial No. 502,354, filed September 14, 1943.

Having thus described my invention as applied to the latch line for a dipper dump door latch, the same being to illustrate one useful application thereof, it is to be understood that my invention will be within the skill of the art readily applicable to similar operations relating to other lines employed in power shovels or the like, power cranes or mining excavating or load handling mechanisms and that the application thereof thereto will be obvious to those skilled in the art and the scope of my invention, as claimed, comprehends such analogous uses as well as various departures from the particular structure herein illustrated and described in connection with a single embodiment thereof.

I claim:

1. The combination with a dump bottom latch of a mobile power shovel dipper and the latch line for operating the said latch and a power driven shaft disposed upon the turntable of such shovel, of a winding drum to which said line is secured for variable winding thereon, a friction type clutch and an electromagnetic drag type clutch both adapted to frictionally communicate a rotative effort to said drum from said shaft, electrical current supply means normally operative to communicate a limited electrical current to the magnet of said electromagnetic clutch to maintain such sufficient winding effort on said drum by magnetic drag effect as to maintain said line taut during operative movements of said dipper, supplemental means comprising a manually operable current flow controller to substantially increase the flow of current to said magnet to increase such magnetic drag effect, said electromagnetic clutch comprising a mechanical element adapted to be deflected from its normal position responsive to such increased drag effect and a friction clutch operating link operable by defective movement of said mechanical element to operate said friction clutch whereby by manual operation of said controller said line is given an increased pull over that required to maintain the line taut to operate said latch to release said dipper bottom.

2. The combination with a spring retracted latch for releasably retaining the dump door of a mobile power shovel dipper in closed position of a latch line and turntable carried power mechanism comprising a prime mover and a shaft rotated thereby, a winding drum rotatably journaled on said shaft, a latch line interconnecting said latch and said drum adapted for partial winding of a line end upon the drum, a mechanical friction clutch and an electromagnetic drag type clutch each comprising a part carried by and rotatable with said drum, an arm movable to energize said friction clutch, said electromagnetic clutch comprising an electromagnet, said magnet carried by said arm and adapted when

energized by a limited flow of an electrical current therethrough to effect a sufficient magnetic drag frictional engagement between the said parts of said electromagnetic clutch whereby to transmit a winding effort from said shaft to said drum to maintain said latch line taut but insufficient to operate said latch against the power of its associated spring and manually operable current flow controlling means adapted to substantially increase the flow of current through said magnet to so increase the magnetic drag effect as to effect a limited deflection of said arm operation of said friction clutch and a resultant increase in the strength of pull upon said line whereby said latch is operated to release said dipper door.

3. Mechanism for exerting a constant relatively light pull upon the latch line of a mobile power shovel dipper dump bottom and alternately adapted to exert a stronger latch operating pull thereon, the pulling end of said line being windable upon a winding drum, comprising the combination with said drum and a power shaft with which said drum is associated, an electromagnetic friction drag type clutch adapted when energized by a normal operating electrical current flow directed through the magnet thereof to exert a winding effort from said shaft upon said drum to merely maintain the line taut during normal operating position, and means comprising a friction clutch operably responsive to an increased energization of said electromagnetic clutch upon an increase of such current flow to exert such greater winding effort upon said drum as to operate said latch and manually operable electrical current controlling means adapted when in one position to maintain said normal current flow and in an alternate position to substantially increase said flow.

4. The combination with a mobile power shovel comprising a turntable, a prime mover and a shaft rotatable thereby carried by the turntable, a latch line winding drum journaled upon said shaft, a boom dipper stick and dipper adjustably carried by said turntable and in extensible relation thereto, a dump bottom for said dipper, a spring retracted latch for normally maintaining said bottom in closed position, a latch operating line interconnecting said drum and said latch, a magnetic drag type clutch adapted when energized by a limited electrical current flow through the magnet thereof to transmit a sufficient line winding effort upon said drum to maintain said line winding taut and insufficient to overcome the power of the latch spring a friction clutch adapted when energized to transmit from said shaft to said drum a stronger winding effort sufficient to overcome the latch spring to operate the latch, an element associated with said electromagnetic clutch responsive to an increased driving torque thereof adapted to operate said friction clutch to a degree commensurable to the driving torque at the time transmitted to said drum by said electromagnetic clutch, and electrical current flow controlling means to alternately vary the current flow to said magnet to effect operation of only said electromagnetic clutch to maintain said latch line taut, or to operate both said clutches to operate said latch.

5. The combination with power shovel mechanism comprising a rotatable turntable, a boom hingedly connected to the turntable adapted to be swung thereby and to have its free end portions variously adjusted in a vertical plane, a

dipper stick longitudinally adjustable transversely of said boom and carried thereby, a dipper having a dump bottom secured to an end of the dipper stick, power means and a shaft driven thereby on said turntable, an oscillatable latch for releasably holding said dump bottom in dipper closed position, and a latch line of a drum journaled on said power shaft, said line extending between said latch and said drum and secured in winding relation to said drum; clutch means comprising a friction clutch and an electromagnetic clutch, each for separately communicating a driving effort from said shaft to said drum, each of said clutches comprising a shaft carried and a drum carried part, the two said parts for the magnetic clutch being disposed in face-to-face magnetic drag relation and one of said parts being yieldably mounted upon its carrier for limited angular displacement thereon, responsive to the torque load imposed upon said part, mechanical means for said friction clutch, movable responsive to the deflection movement of said magnetic clutch deflectable part to energize said friction clutch to a degree commensurable to said torque load, a source of electrical current supply for normally energizing the magnet of said electromagnetic clutch to a limited degree of energization, and manually operable strength-of-current controlling means adapted to substantially increase the supply of current to said magnet, whereby said drum normally maintains said latch line taut by limited operation of said clutch means upon a lesser energization of said electromagnetic clutch and whereby said line may exert a sufficiently strong pull upon said latch to oscillate it to dump bottom releasing position, and retracting means to restore said latch to dipper bottom latching position against the pull normally exerted upon said latch line as a result of normal energization of said magnet.

6. Mechanism for maintaining taut lines such as latch lines, tag lines or the like leading from a rotatable turntable to an excavating shovel or bucket implement comprising in combination with said line a power driven shaft disposed upon the turntable, a winding drum upon which an end of said line is disposed in winding relation, said drum rotatably carried by said shaft, a mechanical friction clutch and an electromagnetic drag type clutch each comprising a part carried by and rotatable with said shaft and a part carried by and rotatable with said drum, an arm movable to energize said friction clutch, said electromagnetic clutch comprising an electromagnet, said magnet carried by said arm and adapted when energized by a limited flow of an electrical current therethrough to effect a sufficient magnetic drag frictional engagement between the said parts of said electromagnetic clutch whereby to transmit a winding effort from said shaft to said drum to maintain said latch line taut, and manually operable current flow controlling means adapted to regulate the flow of current through said magnet whereby by operation of said controlling means the operator may limit the pull upon said line to that degree of pull within the power of pulling effort capable of being communicated by said electromagnetic clutch or to effect a greater pull by co-operative pulling efforts of both such related clutches.

7. Mechanism for maintaining taut lines such as latch lines, tag lines or the like leading from

a rotatable turntable to an excavating shovel or bucket implement comprising in combination with said line a power driven shaft disposed upon the turntable, a winding drum upon which an end of said line is disposed in winding relation, said drum rotatably carried by said shaft, an electromagnetic friction drag type clutch adapted when energized by a normal operating electrical current flow directed through the magnet thereof to exert a winding effort from said shaft upon said drum, and means compris-

ing a friction clutch operably responsive to an increased energization of said electromagnetic clutch upon an increase of such current flow to exert such greater winding effort upon said drum as to operate said latch and manually operable electrical current controlling means adapted when in one position to maintain said normal current flow and in an alternate position to substantially increase said flow.

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