Oct. 31, 1961 C. CIMINO 3,006,608

DRAGLINE FAIRLEAD

Filed June 10, 1958 2 Sheets-Sheet 1

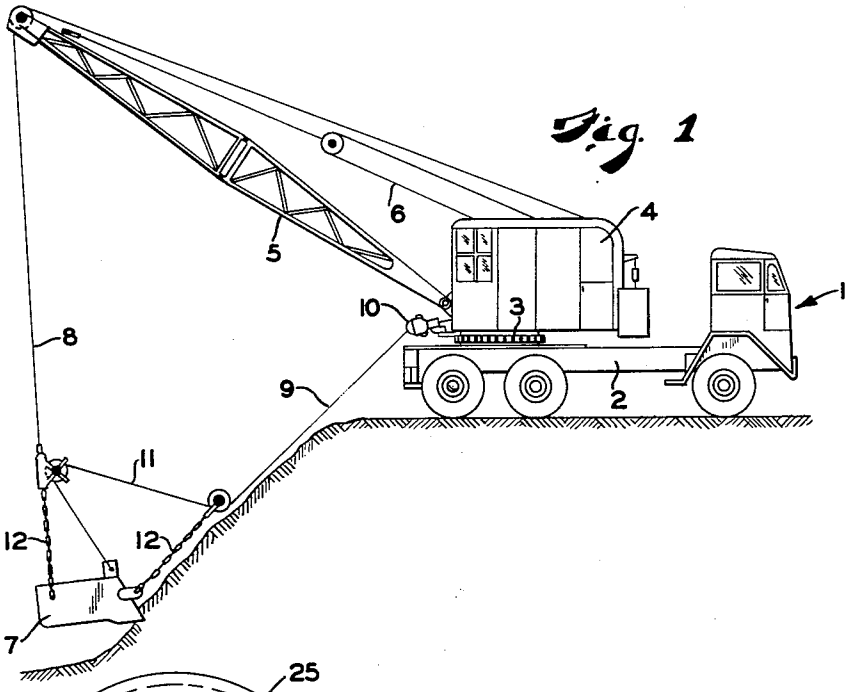

Fig. 1

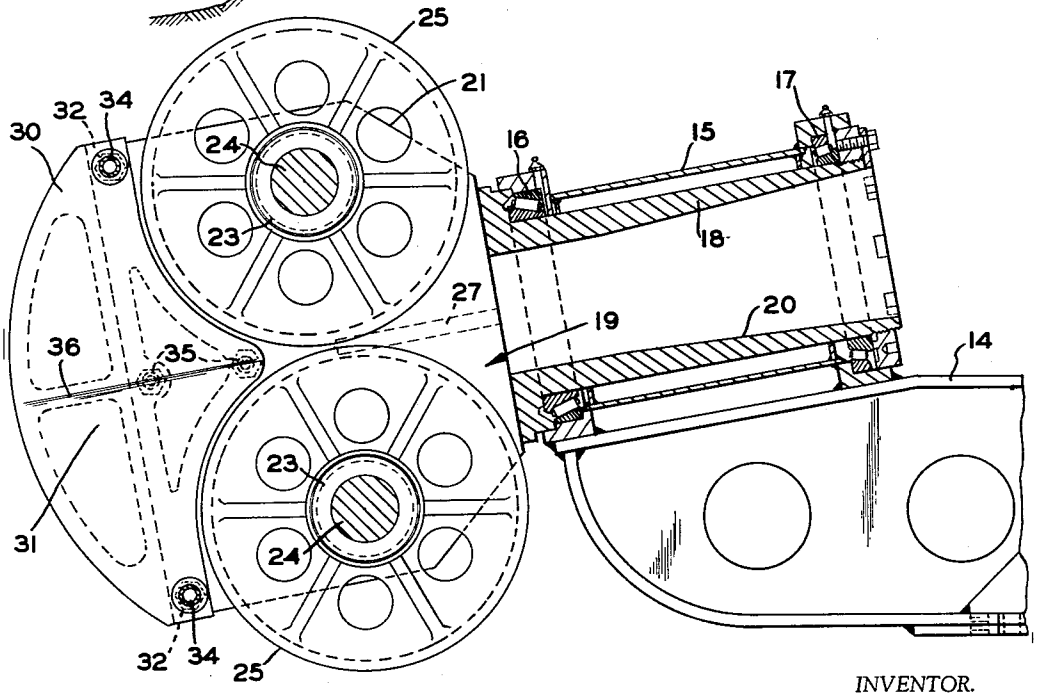

Fig. 2

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DRAGLINE FAIRLEAD

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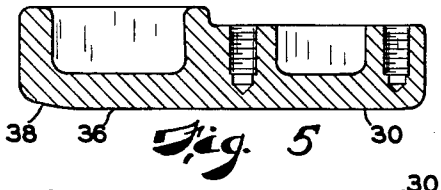

Fig. 5

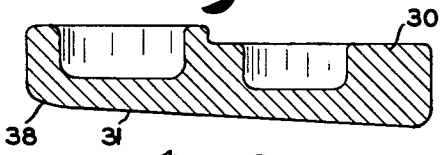

Fig. 6

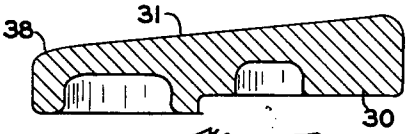

Fig. 7

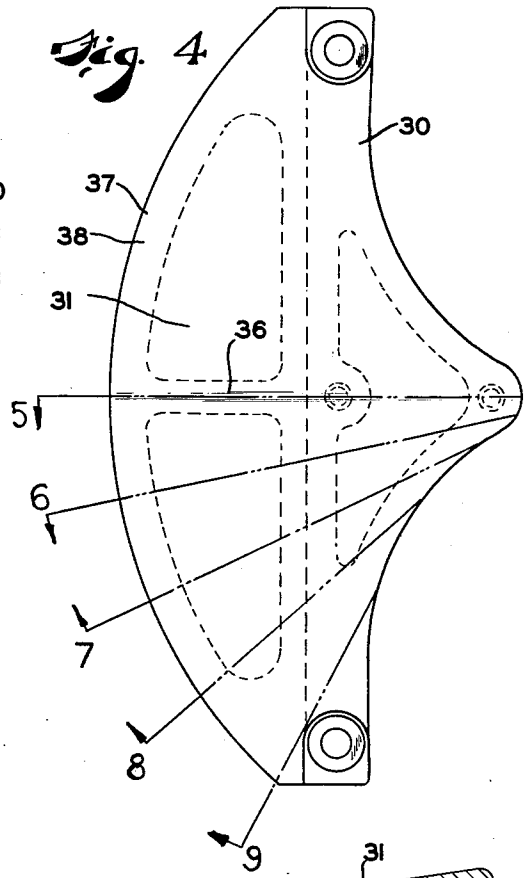

Fig. 4

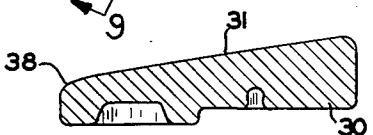

Fig. 8

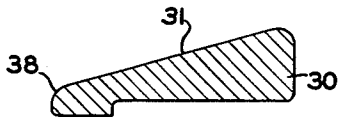

Fig. 9

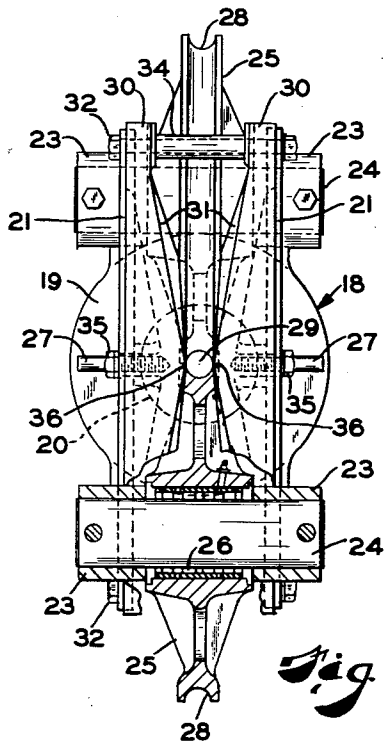

Fig. 3

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3,006,608
DRAGLINE FAIRLEAD

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Filed June 10, 1958, Ser. No. 741,133
1 Claim. (Cl. 254—190)

The present invention relates generally as indicated to a dragline fairlead for drag buckets, scoops or the like, as are employed with cranes and power shovels.

Hitherto, and as well known in the art, it has been proposed to provide on the turntable bed of equipment of the character referred to, a sheave housing carrying intergeared sheaves between which the dragline cable moves lineally as it is wound onto and wound from a winding drum carried or mounted in the cab portion of the superstructure. In order to guide the cable through continually varying angles with respect to said intergeared sheaves, it has been proposed to provide a secondary sheave housing which is pivotally mounted on the main sheave housing about an axis parallel to the axes of the intergeared sheaves and which carries another pair of sheaves between which the cable moves at different angles. For an example of that type of dragline fairlead, see the patent to E. J. Wilson, Pat. No. 2,043,362, granted June 9, 1936.

It also has been proposed heretofore to provide a swivelly mounted sheave housing in which the sheave groove in which the dragline cable is engaged is disposed eccentrically with respect to the swivel axis of the housing, whereby, when the forward end of the cable leading to the dragline bucket or scoop is pulling at different angles, the housing is caused to swing about its swivel axis.

With the foregoing in mind, it is one principal object of this invention to provide a simple and efficient form of dragline fairlead which is of the full-revolving type and which freely and instantly responds to dragline cable pull in all directions whether up or down, or to either side.

It is another object of this invention to provide a dragline fairlead which is swivelly mounted about an axis coinciding with the longitudinal axis of the dragline cable and which has guide members engaged by the cable and effective to turn the fairlead to position the sheaves thereof in the plane of the cable as defined by the portions extending from the fairlead toward the cable winding drum and toward the dragline bucket.

It is another object of this invention to provide a dragline fairlead which has cable guide members formed with cam surfaces through which the fairlead is turned to proper operating position even when the angling of the dragline cable is directly to the side i.e., in a plane normal the median trans-axial plane of the sheaves.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claim, the following description and the annexed drawings setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a side elevation view of a motor crane designed for manipulating a dragline bucket which is adapted to be raised and lowered with respect to the peak or tip of the boom and which has secured thereto a dragline cable passing through a dragline fairlead on

the turntable bed to a cable winding drum in the crain cab;

FIG. 2 is a side elevation view, on enlarged scale and partly in cross-section, showing the dragline fairlead which constitutes the present invention;

FIG. 3 is an elevation view, again partly in cross-section, as viewed toward the right from the left-hand side of FIG. 2;

FIG. 4 is a plan view of one of the opposite cable guide members; and

FIGS. 5 to 9 are cross-section views taken along the lines 5 to 9 of FIG. 4.

Referring now in detail to the drawings, and first to FIG. 1, there is illustrated a motor crane **1** comprising the carrier **2**, and a turntable **3** and crane cab **4** which is mounted for rotation about a vertical axis. Within the cab **4** are the usual control levers and the like, by which several cable winding drums (not shown) are actuated. The foot of the boom **5** is pivotally mounted as shown, and secured to the tip of the boom **5** is a hoist cable system **6** (controlled by a boom hoist drum) for raising and lowering the boom. Suspended from the tip of the boom **5** is a dragline bucket **7** which is raised and lowered by the fall cable **8** which is wound onto and from another drum in cab **4**. The dragline cable **9** is operatively connected to the dragline bucket **7** and passes through a dragline fairlead **10** mounted on the turntable bed, the cable **9** extending into the cab **4** and being wound onto and from yet another drum therein.

The cab **4** will also contain suitable controls by which the boom **5** is swung about a vertical axis to position the dragline bucket **7** where desired for digging or scraping operations and for dumping the contents at selected places.

The dragline bucket **7** herein is shown, by way of example only, as being of the self-filling type with an open top and digging end. When the bucket has been filled it is raised by keeping the dragline cable **9** taut and lifting on the fall cable **8** and is dumped by slacking off on the dragline cable **9**. The cable **11** holds up dragline cable **9** and the bridle chains **12** while dumping the contents of the bucket **7**. As evident, the dragline fairlead **10** keeps the cable **9** out of scraping contact with the turntable bed **3** and carrier **2** and must be capable of accommodating not only the continually varying angles of the front portion of the cable **9** between the fairlead **10** and the bucket **7** in a vertical plane but, as well, the side casting angles due to swinging of the bucket **7** from one side to the other as the boom **5** is swung about the vertical axis of the turntable **3**.

Referring now to the dragline fairlead **10**, the same, as best shown in FIGS. 2 to 9, comprises a fairlead housing **14** which is adapted to be mounted on the turntable bed **3** in fixed position and the front end portion thereof is formed with an obliquely disposed sleeve assembly **15** providing recesses at its respective ends for tapered roller bearings **16** and **17**.

Journalled in the bearings **16** and **17** is the rearwardly and upwardly extending tubular shank **18** of the sheave frame **19** which has an opening **20** for passage of the dragline cable **9** longitudinally therethrough and which has opposite side plates **21**, **21** provided with two pairs of bosses **23** carrying the respective pins **24** on which the respective sheaves **25** are mounted on bearings **26**. The connection between the opposite side plates **21** and the tubular shank **18** is strengthened by means of the reinforcing webs **27**, as best shown in FIGS. 2 and 3. Each sheave **25** is formed with a peripheral groove **28** of approximately semi-circular cross-section, the axes of the pins **24** being parallel and spaced apart a distance such that the pitch diameters of the sheaves **25** are tangent to thus form a circular passage **29** therebetween which is

aligned with the centerline of the tubular shank **18** of the sheave frame **19**.

To the front of the sheaves **25** and between the side plates there are opposed cable guide bars or members **30** having specially formed inside faces **31** adapted to be engaged by the dragline cable **9** to swivel the sheave frame **19** about the axis of the tubular shank **18**. These cable guide members **30** are secured to the side plates **21** as by bolts and nuts **32** with spacer tubes or collars **34** therebetween to maintain them in predetermined spaced apart relation.

The cable guide members **30** are shaped as shown to enter the bight of the sheaves **25** and screws **35** may be employed to firmly secure these rearwardly extending portions to the side plates **21**.

Referring now to FIGS. 3 to 9, each cable guide member **30** is formed with an inner face **31** which tapers in two directions (forwardly and outwardly) with respect to a center ridge or vertex **36** that is parallel to the axis of rotation of the sheave frame **19** and aligned with diametrically opposite sides of the passage **29**.

From the foregoing, it can be seen that if the dragline cable **9** extends straight through the sheave frame **19** and passage **29** it will be uniformly engaged between both sheaves **25**. Should the bucket end of the cable **9** swing upwardly or downwardly in the median trans-axial plane of the sheaves **25** it will engage around one sheave **25** or the other and will be uniformly guided thereby without wear on the cable.

Said ridge **36** and the front arcuate portion **37** of each guide member **30** terminates in a rounded portion **38**, as shown in FIGS. 5 to 9. Thus, a cable extending along the line **5** in FIG. 4 or along said ridge **36**, will, when angled to one side or the other, from the median plane of the sheaves **25** be caused to slide down one side or the other of the inner face **31** from the vertex or ridge **36**, to thereby apply a force on the corresponding cable guide member **30** to cause the balanced sheave frame **19** to turn so that the median plane of the sheaves **25** lies in the plane of the bend of the cable **9**. As is evident from FIG. 2 of the drawing, the front arcuate edge portion **37** of each guide member is arcuate with the centers of the arcuate edge portions **37** being the tangent point of the sheaves and, of course, the axis or center line of the tubular shank portion **18**.

As represented by the lines **6**, **7**, **8**, and **9**, in FIG. 4, and the corresponding sections, FIGS. 6 to 9, respectively, the cable **9** when angled with respect to the median plane of the sheaves **25**, will bear on one of the cable guide members **30** at progressively increasing distances from the centerline or ridge **36** to keep the median trans-axial plane of the sheaves **25** in the same plane as the bend of the cable **9** so that the cable will be engaged properly in the groove **28** of one of the sheaves **25**. The inner faces **31** of the guide members **30** thus act as cams to swivel the sheave frame **19** and serve to prevent rubbing contact of the dragline cable **9** with the side portions of the sheave grooves **28**.

Preferably, the cable guide members **30** are made of material of hardness comparable with that of the cable **9**. For a cable **9** of 600 Brinell hardness, the members **30** may be of chilled cast iron. The cable guide members **30** keep the cable from becoming wedged between the peripheries of the sheaves **25** and, at the same time, provide the inner cam faces **31** to freely and instantly swivel the sheave frame **19** in response to dragline cable pull in any direction.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in the following claim, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

A dragline fairlead comprising a sheave frame having a tubular shank portion and carrying a pair of sheaves for rotation about parallel axes that are spaced apart a distance such that the pitch diameters of said sheaves are tangent, each sheave being formed with a peripheral groove of approximately semi-circular cross-section, said sheaves thus forming a circular passage therebetween, said circular passage being aligned with the center line of said tubular shank portion of said sheave frame; spaced tapered bearing means supporting said tubular shank for turning about an axis coincident with the center line of said tubular shank portion, said axis being tangent to both said sheaves; and cable guide members fixed to said sheave frame and having central opposed ridges and uniformly sloping sides facing one another, elongated spacing collars between said guide members for firmly holding said guide members apart, said collars being at the outer extremities of said guide members on opposite sides of said ridges and being outwardly spaced from said tubular shank bearing portions a distance, along the axis of said center line of said tubular shank, greater than the diameter of said sheaves whereby said sheaves may be laterally removed from said frame without disassembling said fairlead, the outer edges of said guide members being arcuate, with the center of said arcuate edges being the tangent point of said sheaves and said axis, said guide members along said ridges thus extending substantially outwardly as far from the tangent point of said sheaves as the outer extremities of said guide members and providing an equal elongated moment arm for all cable positions so that when a cable extending tangentially between said sheaves is pulled at an angle to the plane of said sheaves and to the center line of said tubular shank portion, the cable is caused to slide along one of said uniformly sloping sides thus exerting a turning force on said sheave frame through such elongated moment arm.

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