March 24, 1931. J. E. DALE 1,797,331

FAIR LEAD

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Fig. 1.

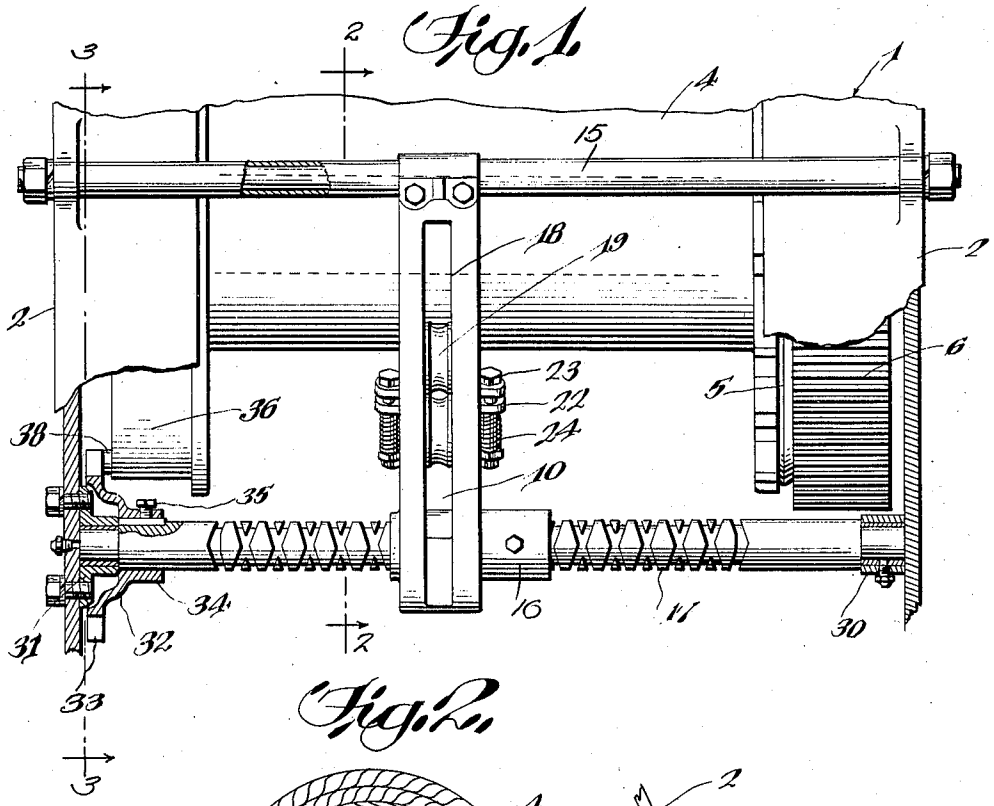
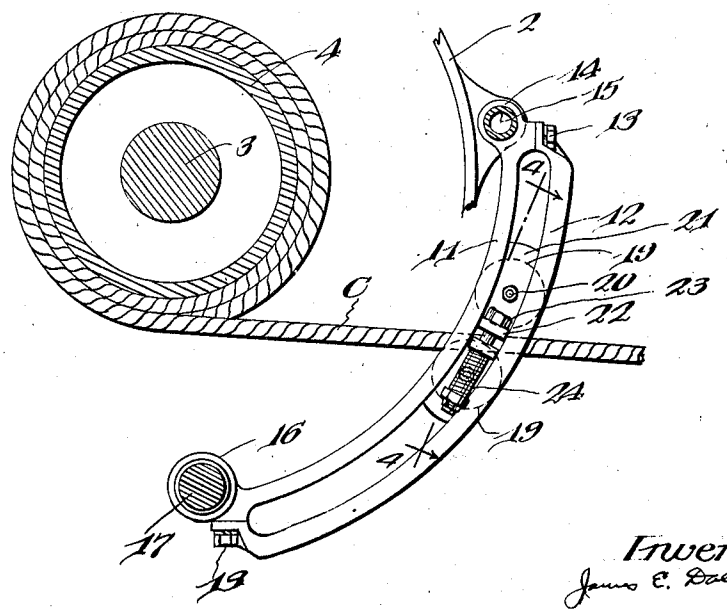


Fig. 2.



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Fig. 3.

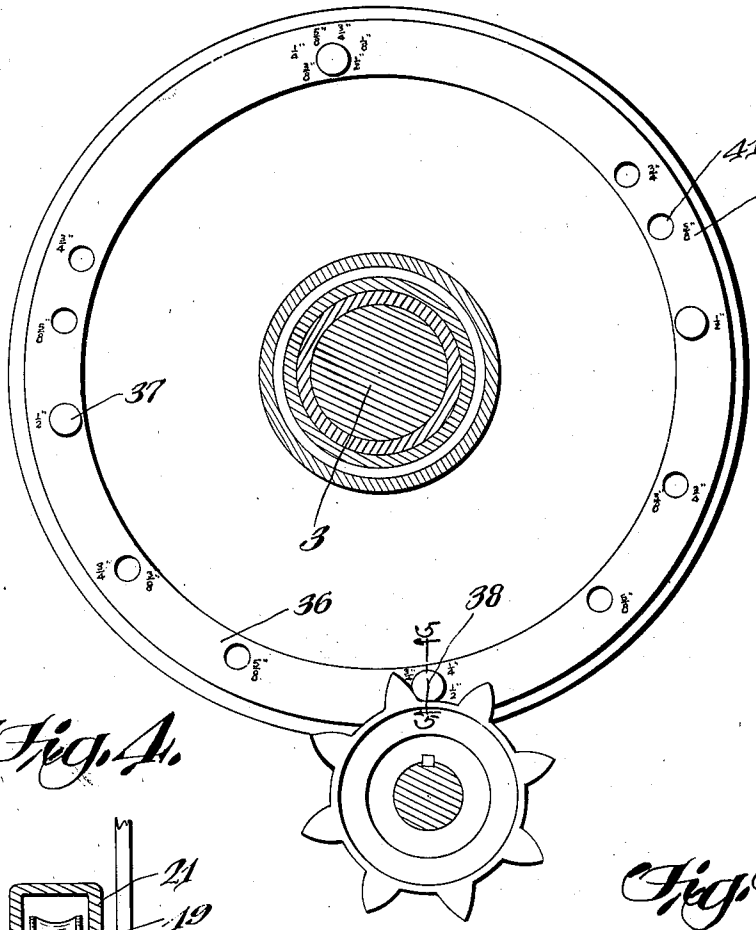


Fig. 4.

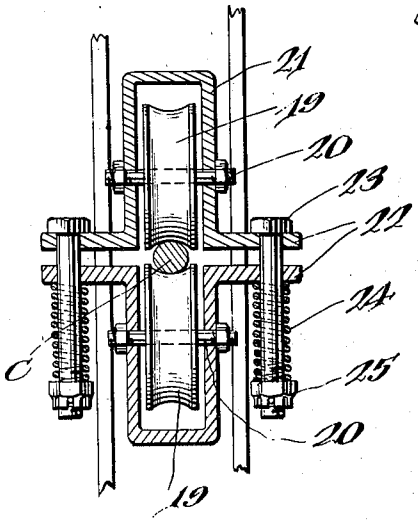
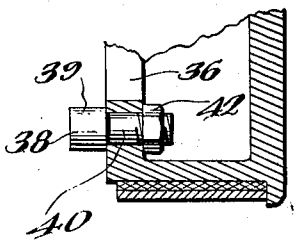


Fig. 5.



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UNITED STATES PATENT OFFICE

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FAIR-LEAD

Application filed December 30, 1929. Serial No. 417,397.

This invention relates to a fair lead for hoists.

Heretofore in the art it has been proposed to provide a fair lead for hoists in which a traveling guide or pulley arrangement for the cable was driven back and forth transversely across the drum by means of a double threaded or double acting screw to cause the cable to wind snugly and uniformly back and forth on the drum. In all prior constructions the screw of the fair lead was driven at a constant speed from the shaft driving the drum. As a consequence, whenever the size of the cable employed on the drum was changed it was necessary to provide a screw of different pitch because the traveling guide or pulley must necessarily have a speed back and forth across the drum proportional to the size of the cable. Thus, with a one inch cable the guide must travel across the drum a distance of one inch for each revolution of the drum; with a half inch cable the guide must travel one-half inch for each drum revolution and corresponding speeds must be had for the other cable size. The expense of providing a screw of different pitch for each of the cable sizes employed and the labor and time required to change the screw each time a cable of different size is employed involves such serious disadvantages from a practical point of view as to preclude the use of these old types of fair lead under most circumstances and this notwithstanding that a fair lead of this character is highly desirable. In the absence of such a fair lead it is frequently necessary to have several additional men on a hoist who utilize crow bars to constantly pry the convolutions of the cable into proper position as the cable is wound on the drum.

One of the principal objects of the present invention resides in the provision of a fair lead of this character in which the traveling guide is driven at variable speeds back and forth across the drum depending upon the size of the cable employed and this without changing the screw by which the guide is driven. The variation in the speed of rotation of the screw and consequently the rate of travel of the guide is effected in an easy and expeditious manner and without the employment of any complicated or elaborate construction. On the contrary, the variable speed mechanism employed for driving the screw in timed relation to the drum of the hoist is of far simpler construction than the constant speed driving mechanism heretofore employed, is more reliable and effective in operation and less expensive to manufacture.

Another object of the invention resides in the provision of a novel form of traveling guide which not only guides but also grips the cable to prevent the same from uncoiling and entangling under any circumstances. If, for instance, the cable should be under heavy tension as in pulling a stump and the stump is suddenly released by the ground or the cable snaps under excessive load, the gripping engagement between the guide and the cable will hold the convolutions properly positioned and tightly wound on the drum even though the tension of the cable beyond the guide be entirely relieved. Another advantage of the guide resides in its ability to automatically position itself at the proper level for effective cooperation with the cable. Thus, as the cable is built up on the drum in successive layers the guide will raise automatically and on the other hand when the cable is paid out and there are less layers on the drum, the guide will lower automatically. The guide partakes of the same action depending upon the relative level of the load with respect to the hoist.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a fragmentary view partly in front elevation and partly in section showing a drum of a hoist having a fair lead organized therewith and embodying the present invention;

Figure 2 is a fragmentary view in section taken on line 2—2 of Figure 1;

Figure 3 is a similar view taken on line 3—3 of Figure 1;

Figure 4 is a fragmentary detail view taken on line 4—4 of Figure 2, with parts shown in elevation for the sake of simplicity in illustration; and

Figure 5 is a fragmentary detail sectional view taken on line 5—5 of Figure 3 with parts shown in elevation for the sake of simplicity in illustration.

Referring to the drawings, the numeral 1 designates a hoist shown as having side frame members 2 supporting a power driven shaft 3 in accordance with the usual practice. A drum 4 is loosely mounted on the shaft 3 and may be connected thereto and constrained to rotate therewith by means of cooperable clutch members 5 and 6, the clutch member 5 being fixed to the drum and the clutch member 6 being formed within a gear wheel keyed to the shaft 3. The purpose of the gear wheel is to take the drive or to provide for the convenient drive of a second drum should a two-drum assembly be required. All of the construction thus far described is conventional and widely used and needs no detailed explanation.

The present invention proposes the provision of a fair lead including a traveling carrier 10 made up of curved or arc-shaped parts or sections 11 and 12 secured together by bolts 13 (see Figure 2). The section 11 is provided with a guide 14 at one end which slidably receives a transverse guide rod 15 extending between and secured to the side frame members of the hoist, as shown in Figure 1. The other end of the section 11 of the carrier is formed with a nut 16 which is interfitted with a double threaded or double acting screw 17. The front and rear sections 11 and 12 of the carrier are provided with alined and longitudinally extending slots 18 which accommodate the edges or peripheries of a pair of rollers or guide sheaves 19.

As shown in Figure 4, the guide pulleys 19 are rotatably mounted on pins 20 fastened in oppositely disposed U-shaped brackets 21. The U-shaped brackets 21 have their legs formed with lugs 22 which extend into the guide-way formed between the sections 11 and 12 to slidably support the pulley assembly on the carrier. For holding the two brackets 21 assembled and maintaining the pulleys 19 in gripping engagement with the cable, bolts 23 are passed through bolt holes in the lugs 22 and have their heads engaged with the lugs 22 of one of the brackets. On each bolt 23 a spring 24 is mounted and is urged against the adjacent lug 22 by means of a nut 25 threaded on the outer end of the bolt. The cable wound on the drum 4 is designated C and passes between and is gripped and guided by the pulleys 19 as shown in Figure 2.

The screw 17 is rotatably supported at its ends in bearings 30 and 31 suitably secured to the side frame members 2 of the hoist (see Figure 1). Adjacent the bearing member 31 a sprocket wheel 32 is provided and has its teeth 33 offset from its hub 34. The hub 34 is suitably secured as at 35 to the screw 17. The teeth 33 of the sprocket wheel 32 are disposed adjacent and in overlapping relation to a flange 36 formed at one end of the drum, as clearly shown in Figures 1 and 3. A suitable number of drive pins 38 are mounted on the flange 36 and coact with the teeth 33 of the sprocket wheel 32 to rotate the sprocket wheel and consequently the screw 17 whenever the drum is rotated. As shown in Figure 3, four pins 38 are provided. However, the number of pins may be varied in accordance with the size of the cable being used. For this purpose each pin is provided with a head 39 as shown in Figure 5 and with a shank 40 of reduced diameter. The shank 40 of each pin is fitted in an opening 41 provided therefor on the flange 36 of the drum. The rearward end of each shank 40 projects inwardly behind the flange 36 and is threaded to coact with a nut 42 which operates to hold the pin in fixed position on the flange 36. In order that the speed of rotation of the screw 17 may be conveniently varied to adapt the fair lead for use with the various sizes of cables employed, the flange 34 of the drum is provided with a plurality of openings 41 angularly spaced as shown in Figure 3 and adjacent each opening indicia designated at 41^a is provided to indicate which opening or openings must be supplied with pins for each cable size. Thus, as shown in Figure 3, twelve openings 41 are provided. One of the openings must have a drive pin therein for all of the various size cables that the hoist is designed to use and consequently around this opening are the markings $\frac{1}{8}''$, $\frac{1}{4}''$, $\frac{3}{8}''$, $\frac{1}{2}''$, $\frac{3}{4}''$ and $\frac{5}{8}''$; another of the openings has grouped around it the indicia $\frac{1}{4}''$, $\frac{1}{2}''$ and $\frac{3}{4}''$; two of the remaining openings have the indicia $\frac{3}{8}''$ and $\frac{3}{4}''$ associated therewith; two others have indicia $\frac{1}{2}''$ adjacent thereto; two of the remaining openings have the indicia $\frac{3}{4}''$ applied therearound and the remaining four have indicia $\frac{5}{8}''$. Of course, if other cable sizes are to be employed, additional openings are provided and have appropriate indicia associated therewith. The present device is designed for use with a screw having a pitch of $1\frac{1}{32}''$. With a half inch cable such a screw must be rotated one half a revolution for each revolution of the drum in order to appropriately advance the guide. The additional $\frac{1}{32}''$ is required because the convolutions under practical conditions occupy slightly more space than their ideal or geometrical dimensions. The sprocket wheel 33 in the present construction has eight teeth. With a screw of the pitch shown and a

sprocket wheel having eight teeth, only one pin need be employed for a one-eighth inch cable as one pin will impart one-eighth of a revolution to the screw each time the drum makes a complete revolution and consequently will feed the guide transversely one-eighth of an inch plus the additional amount required for the slight clearances that necessarily occur between the convolutions of the cable. For a quarter inch cable two pins are employed in order to impart two impulses to the sprocket wheel and consequently rotate the screw one quarter of a revolution. For a three-eighths inch cable three pins are employed; for a half inch cable four pins, and for a five-eighths inch cable five pins are employed. All that is necessary to change any cable size is for the operator to see that the openings in the flange 36 marked for the cable size are equipped with pins.

It is to be understood that the flange 36 constitutes a driving member which is actuated in timed relation to the movement of the drum. While the driving member may be conveniently constituted by a flange of the drum it may also consist of a spider or plate driven in synchronism with or in timed relation to the drum either directly or indirectly according to the nature of the hoisting mechanism used.

It will be noted that the pulleys 19 are urged into gripping engagement with the cable by the springs 24. Due to this gripping engagement the convolutions of the cable on the drum are retained in proper position and under proper tension even where there is no tension on the cable beyond the pulleys 19. This feature is especially desirable as it avoids uncoiling and entangling of the convolutions of the cable on the drum under the influence of back lash or when the load on the cable is suddenly released as well as under other conditions.

Further, the pulleys 19 are so mounted and supported in the traveling carrier as to be self-leveling under the influence of the cable. In other words, the pulley assembly rises and falls depending upon the level of the load or upon the number of layers of cable wrapped about the drum.

The invention claimed is:

1. A fair lead for use with the cables of hoisting drums of the type having a screw driven guide and comprising a driven element fixed to the screw, a driving member actuated in timed relation with respect to the drum, drive pins, said driving member having means adapted for releasably holding a variable number of the driving pins in position for cooperation with the driven element to rotate the screw at variable speeds depending upon the number of driving pins employed.

2. A fair lead for use with the cables of hoisting drums of the type having a screw driven guide and comprising a sprocket wheel fixed to the screw and overlapping the drum, and a plurality of removable driving pins releasably secured to and projecting laterally from the drum and cooperable with the sprocket wheel to rotate the screw at variable speeds depending upon the number of driving pins employed.

3. In combination with a rotatable drum and a screw operated fair lead therefor, a variable number of removable driving elements mounted on the drum and a driven element mounted on the screw and cooperable with the driving elements.

4. An apparatus of the character described including a drum, a screw operated fair lead therefor, and variable speed mechanism for driving the screw in timed relation to the drum and at variable speeds to adapt the fair lead for use with cables of various sizes.

5. An apparatus of the character described comprising a hoist drum, a screw operated fair lead therefor, a sprocket wheel fixed to the screw and adjacent to and overlapping one end of the drum, said end of the drum having a flange provided with a plurality of openings of variable angular spacing, and a plurality of removable driving pins releasably secured in said openings and cooperable with the sprocket wheel to rotate the screw at variable speeds depending upon the number of pins employed.

6. A fair lead for use with the cables of hoisting drums of the type having a screw driven guide and comprising a sprocket wheel fixed to the screw, a driving member actuated in timed relation with respect to the drum, said driving member having a plurality of openings of variable angular spacing and a plurality of removable driving pins releasably secured in said openings and cooperable with the sprocket wheel to rotate the screw at variable speeds depending upon the number of pins employed.

7. A fair lead for use with the cables of hoisting drums of the type having a screw driven guide and comprising a sprocket wheel fixed to the screw, a driving member actuated in timed relation with respect to the drum, said driving member having a plurality of openings of variable angular spacing and a plurality of removable driving pins releasably secured in said openings and cooperable with the sprocket wheel to rotate the screw at variable speeds depending upon the number of pins employed, there being indicia adjacent each opening to designate which opening or openings must be supplied with pins for the various cable sizes.

In witness whereof, I hereto affix my signature.

JAMES E. DALE.