

Nov. 30, 1943.

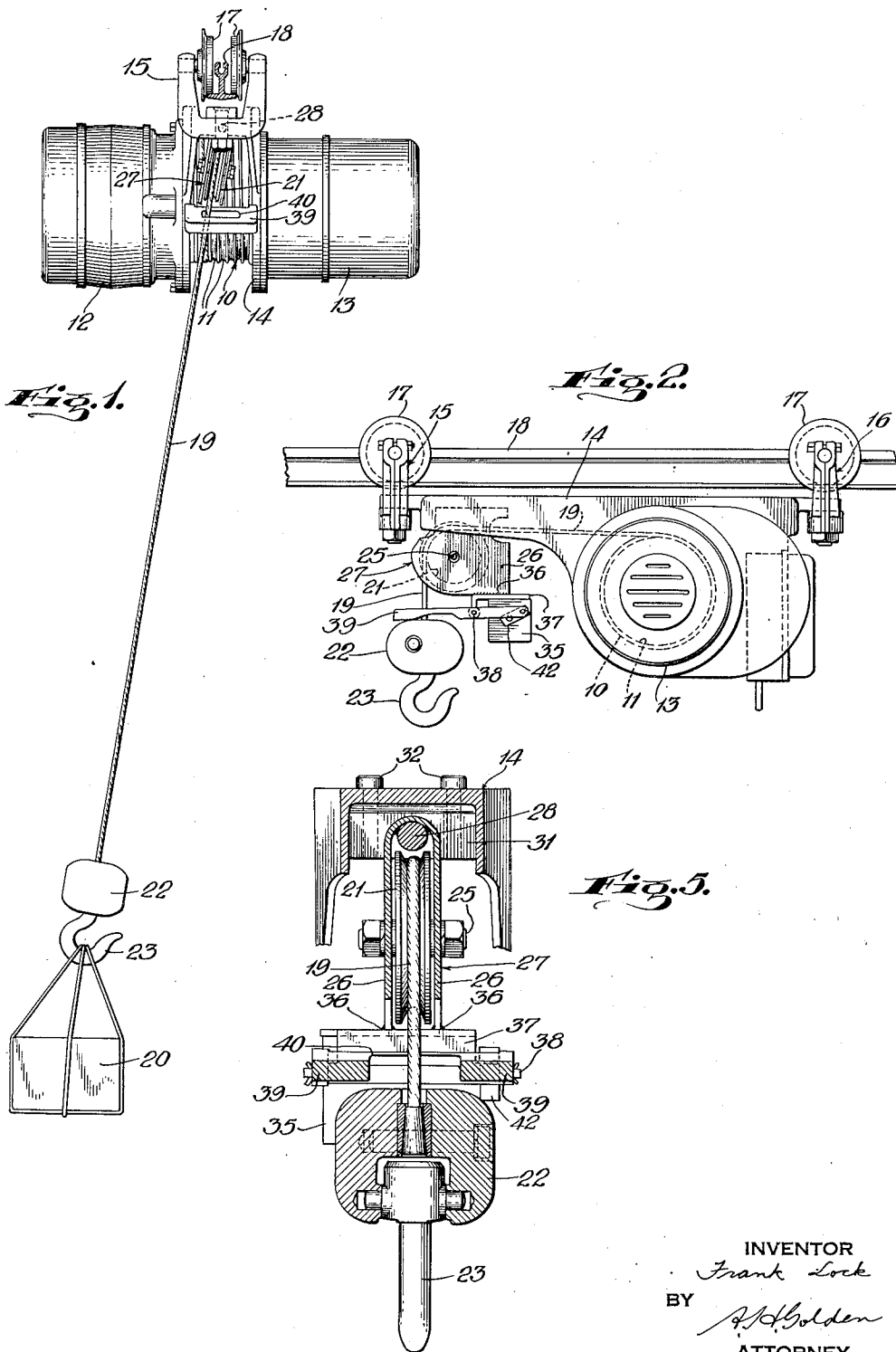
F. LOCK

2,335,568

HOIST

Filed May 15, 1941

2 Sheets-Sheet 1



INVENTOR
Frank Lock
BY *A. H. Golden*
ATTORNEY

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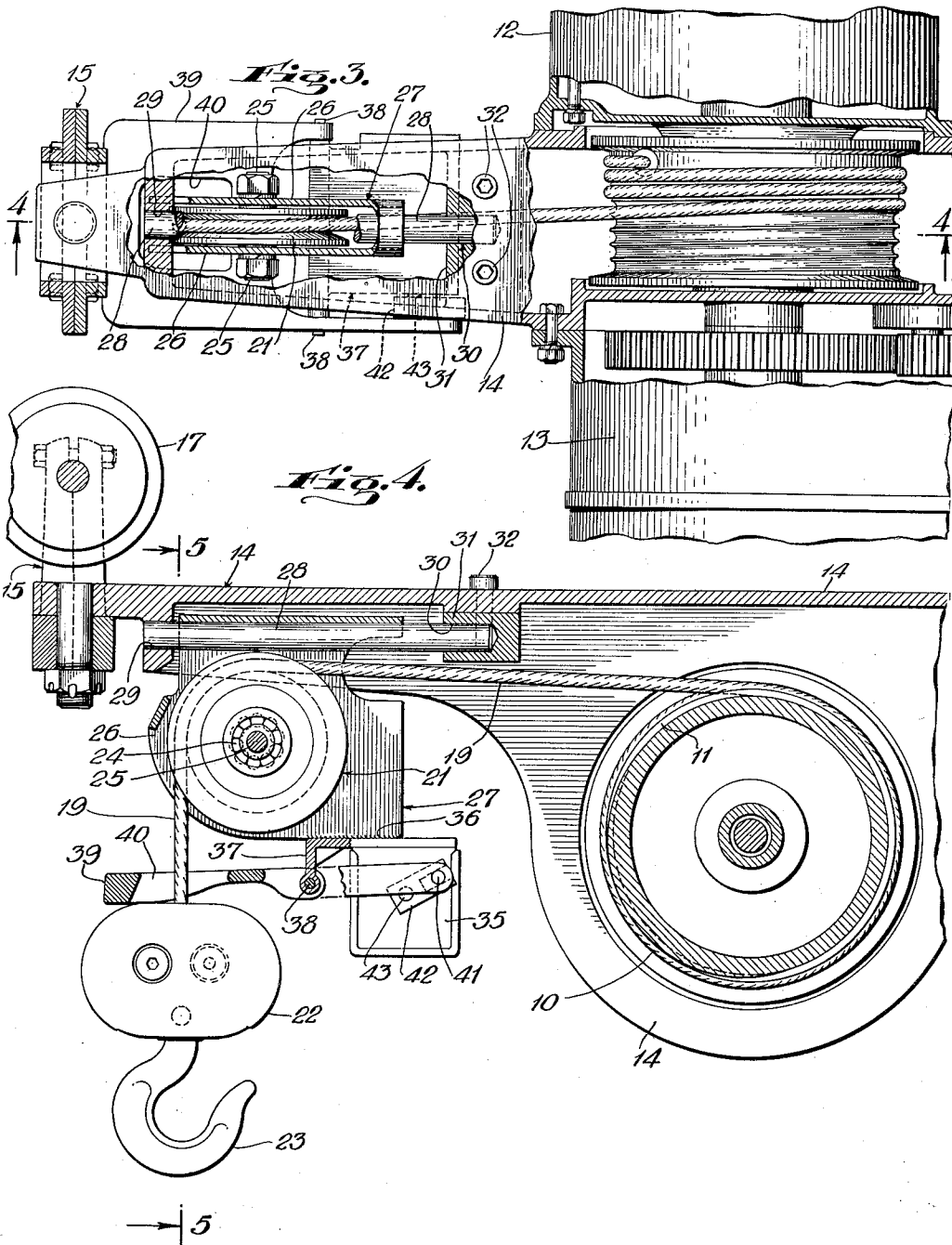
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2 Sheets-Sheet 2



INVENTOR
Frank Lock
BY
H. H. Golden
ATTORNEY

UNITED STATES PATENT OFFICE

2,335,568

HOIST

Frank Lock, Philadelphia, Pa., assignor to The
Yale & Towne Manufacturing Company, Stam-
ford, Conn., a corporation of Connecticut

Application May 15, 1941, Serial No. 393,540

1 Claim. (Cl. 254—168)

This invention relates to a hoisting machine and more particularly to a hoisting machine of the type in which a grooved hoisting drum is rotated by a power mechanism to wind and unwind a cable to which is secured a load to be lifted.

In hoists of the class described, the cable is generally wound and unwound directly on the drum as the load moves in a vertical path directly under the hoisting drum. In some installations, the load is placed in offset relation to the hoisting drum so that the cable assumes an angular position relatively to a vertical line running downwardly from the drum. With the load so offset, and the cable in an angular position, it is very difficult to wind and unwind the cable relatively to the drum, all of which will be fully appreciated by those skilled in the art. My invention relates to means especially adapted to facilitate the winding and unwinding of the cable relatively to the drum when the load is so offset.

As a feature of my invention I use an idler sheave over which the cable passes from the load to the drum, the idler sheave being preferably pivotally mounted so as to follow the angular deflections of the cable from the vertical where the load is to be raised from an offset position by the cable, rather than from a position directly under the winding drum.

As a further feature of the invention, the idler sheave is adapted for this pivoting movement on an axis which is in close juxtaposition to the periphery of the idler sheave. Because of this relation between the pivot axis on which the sheave rotates, and the periphery of the sheave, it will be readily appreciated that the cable will be displaced a relatively small amount as the sheave rotates on its axis, even when its angular movement is considerable. This, of course, is true because the radius of rotation of the cable and sheave about the pivot axis is very small.

As still a further feature of the invention, I mount the limit switch operating means of my hoist, for movement with the idler sheave, so that as the load is elevated, the load hook assembly will actuate the limit switch operating means, regardless of the then angular position of the idler sheave.

While I have thus described generally the more important features of my invention, other valuable features will become apparent upon the reading of the detailed description which follows. Also, while I have set forth what I consider is the best theory of operation of my in-

vention, it should be understood that I do not wish my monopoly to be limited by that theory of operation. Those skilled in the art will fully appreciate that the basic conception of my invention may be incorporated in structural forms other than those which I shall herein describe, and that my patent monopoly should be sufficiently broad to prevent the utilization of that basic conception in such other forms.

For a description of my invention I shall now refer to the drawings, wherein Fig. 1 is an elevation illustrating a hoisting assembly in which my invention is incorporated and showing a load being elevated from a position offset relatively to the hoisting drum. Fig. 2 is a side view of a hoist utilizing my invention. Fig. 3 is a horizontal section taken through the hoist and showing particularly the mounting of the idler sheave. Fig. 4 is a section taken along lines 4—4 of Fig. 3. Fig. 5 is a section taken along lines 5—5 of Fig. 4.

Referring now more particularly to the drawings, the hoist to which I show my invention applied, is of a type well known in the art and comprises a hoisting drum 10 which is grooved at 11, for coaction with a usual type of cable. An electric motor 12 drives the drum 10 through gearing which may be mounted in gear box 13. In a hoist assembly of this type, the casing in which is mounted the motor 12, is usually assembled in opposed and balancing relation to the gear case 13. The gear case 13, together with the motor 12 and its casing, and the drum 10, are supported by what I shall term a main support 14 which is generally in the form of a beam secured at its ends to a forward trolley assembly 15 and a rearward trolley assembly 16. Each trolley assembly comprises a pair of oppositely flanged trolley wheels 17 cooperating with the flanges of a rail 18 in a manner well known in the art, whereby the entire hoist assembly is readily moved from place to place on the rail 18.

As I have already indicated generally, the lifting drum 10 is adapted for rotation to wind and unwind the cable 19 on its grooves 11. In a hoist where the load is to be lifted from a point directly under the hoisting drum, the cable is wound directly on to and off the grooves 11 of the drum. In the type of assembly shown, where the load is many times adapted to be lifted from a point offset relatively to the vertical, as in the case of the load 20 in Fig. 1, I have conceived the novel construction which I shall now describe more particularly.

This construction comprises an idler sheave 21

over which the cable 19 passes toward the load block 22 which supports the load hook 23. The idler sheave 21 is adapted for free rotation on ball-bearings 24 relatively to a shaft 25 mounted in the side plates 26 which form part of a bracket 27. The bracket 27 is suitably secured as by welding or other means, to a pivot shaft 28, this pivot shaft 28 being mounted at its forward end, as best seen in Figs. 3 and 4, in a bearing 29 on the main beam support 14 of my hoist assembly. The rearward end of shaft 28 is mounted on the bearing 30 formed in a bearing block 31 which is secured through bolts 32 to the main beam 14.

As may be well seen from Figs. 1, 4 and 5, the pivot shaft is in close juxtaposition to the outer periphery of the sheave 21 so that the axis of rotation of the sheave 21 and the bracket 27 is quite close to the position occupied by that portion of the cable 19 which passes over the upper peripheral portion of the sheave. Because of this relation of the parts, when the bracket 27 is moved to assume an angular position as in Fig. 1, through pivotal movement about the axis of the shaft 28, that portion of the cable which is in contact with the upper peripheral portion of the sheave 21, will be deflected but slightly. This, as will be observed, is quite true because of the small radius of rotation of the particular portion of the sheave. This slight deflection of the cable will affect very little its relation to the grooves 11 of the winding drum 10 and will not in any way hinder the effective winding or unwinding of the cable on the drum. The novel construction is very helpful in lifting a load which is in an offset position relatively to the hoist as illustrated in Fig. 1.

As I have already indicated generally, the means, for operating the limit mechanism of the hoist, are, in my invention, secured for movement together with the idler sheave. The actual construction is best shown in Figs. 4 and 5 wherein a casing 35 is secured to the bracket 27 as by welding at 36, the casing 35 having mounted therein a limit switch mechanism of any preferred type well known in the art. A bracket 37 extending from the casing 35 and forming a part thereof, has pivoted thereto at 38, a paddle 39

having an opening 40 through which passes the cable 19. That end of the paddle 39 to the right of its pivotal mounting at 38, carries pin 41 which is in operative engagement with a bifurcated lever 42 pivoted at 43 to the casing 35.

It is now quite obvious that as the winding of cable 19 on drum 10 brings the load block 22 to the position of Figs. 4 and 5, the load block actuates the paddle 39 to move the bifurcated lever 42 and operate the limit switch in accordance with the usual practice, to stop the running of the hoist motor 12. It will thus be readily perceived that by the particular novel combination, the limit switch mechanism is readily actuated by the cable 19 in any angular position which it may assume due to the location of the load relatively to the hoisting mechanism. The advantages of the particular combination will be well appreciated by those skilled in the art.

I now claim:

In a hoist of the class described, a suspended longitudinally extending main support, a grooved cable winding drum rotatably mounted at one end of said support, power means in geared connection with said drum and juxtaposed relatively thereto, a cable adapted to be wound and unwound on said drum, a load hook assembly supported by said cable, an idler sheave over which said cable passes from said load hook to said drum, a bracket on which said idler sheave is supported for rotation, a pivot shaft for said bracket positioned with its axis substantially juxtaposed to that portion of the outer periphery of said idler sheave on which the cable passes toward the drum, bearing means on said main support for mounting said pivot shaft in longitudinal spaced relation to said grooved cable winding drum and on an axis substantially tangential to the grooves of said cable winding drum whereby said bracket and sheave are adapted for directional pivotal movement about the axis of said shaft, and a limit switch operating member carried on said bracket for pivotal movement therewith and adapted for movement by the load hook assembly relatively to said bracket as it approaches said bracket.

FRANK LOCK.