July 24, 1951 F. H. H. FOSS 2,562,028

TAKE-UP REEL

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FIG. 1.

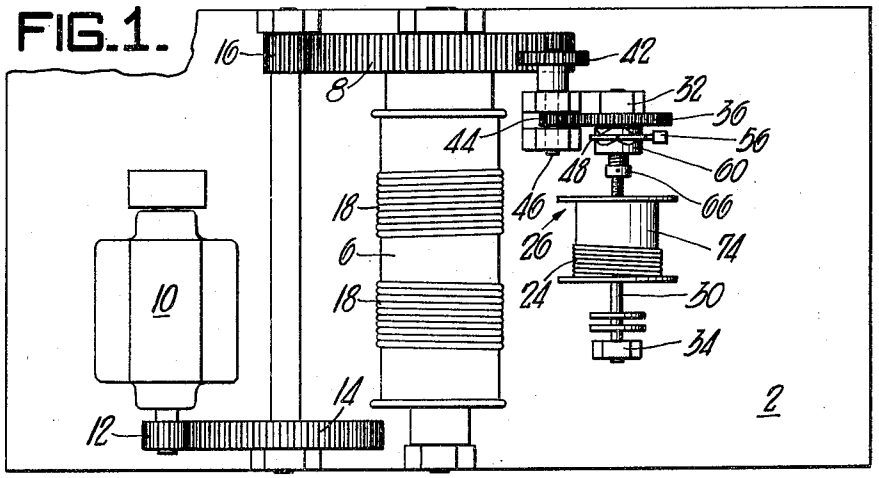
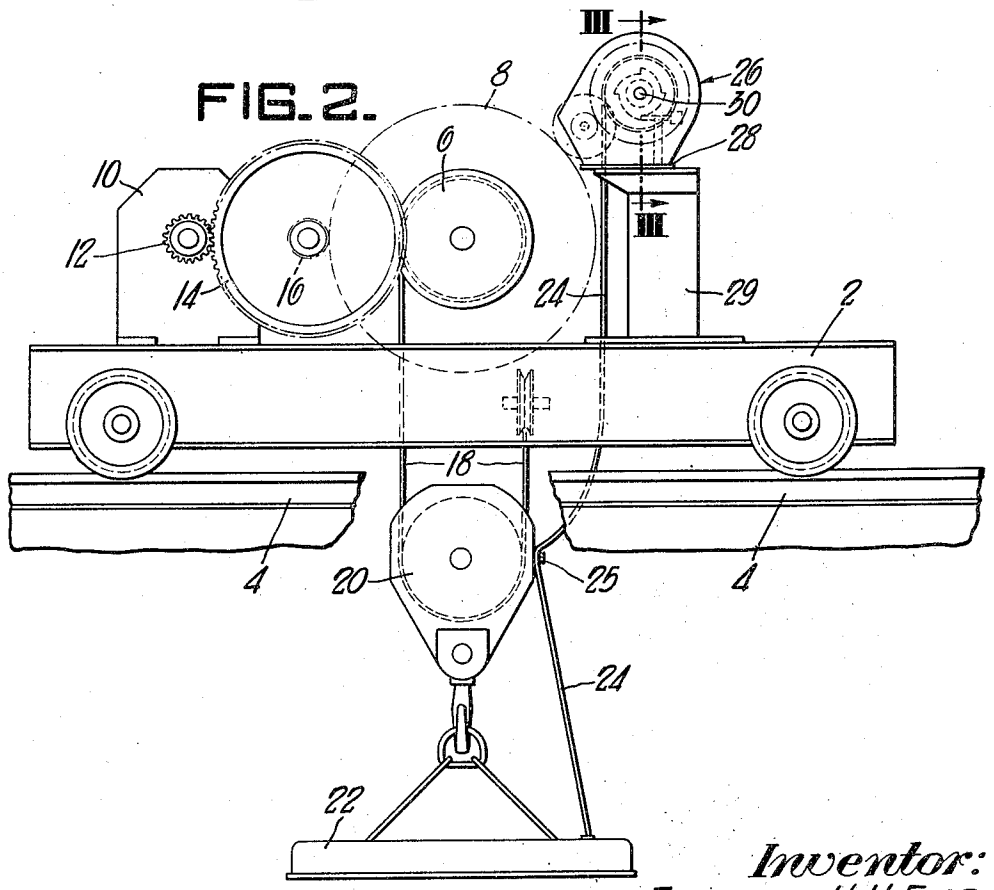


FIG. 2.



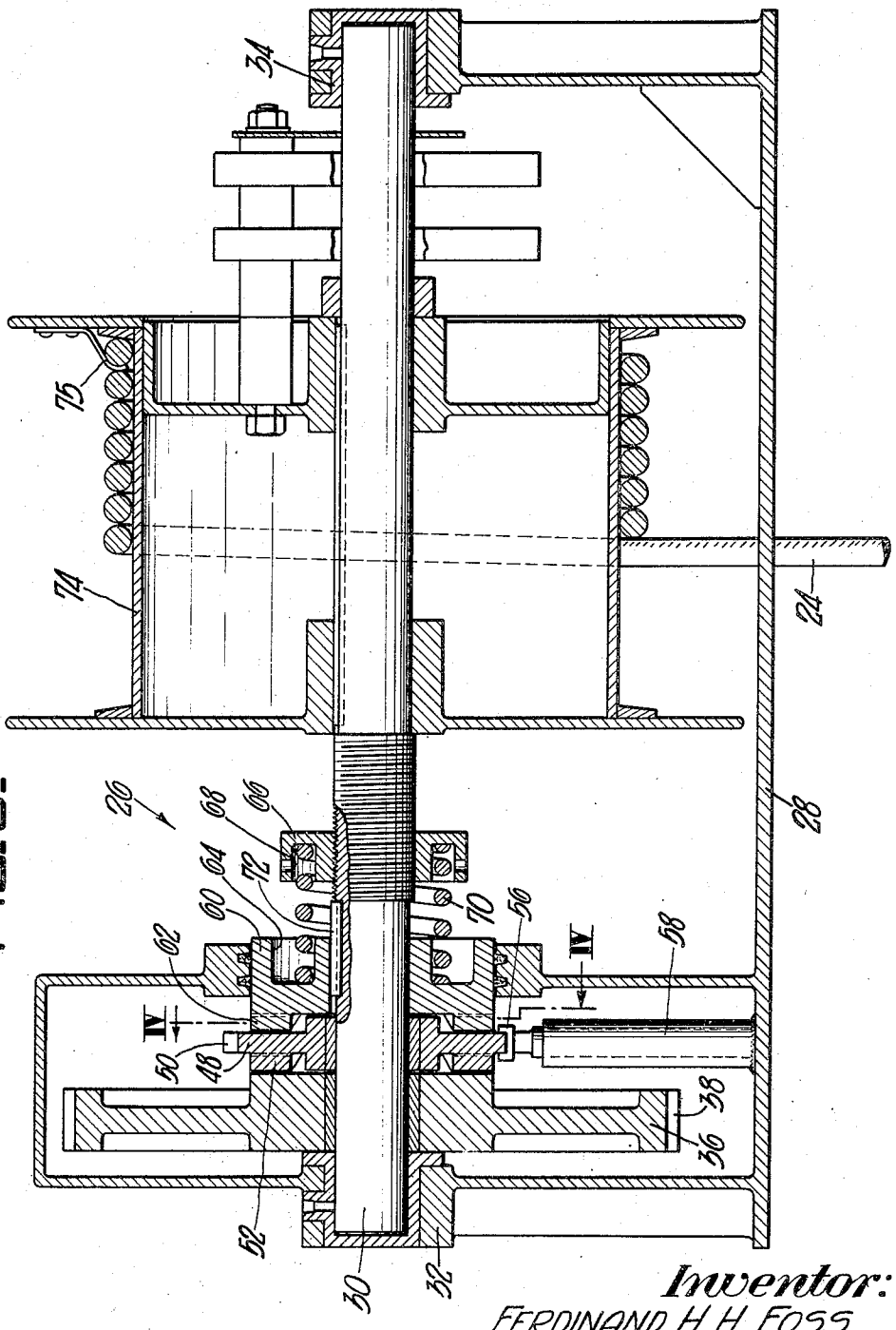
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FIG. 3.



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FIG. 4.

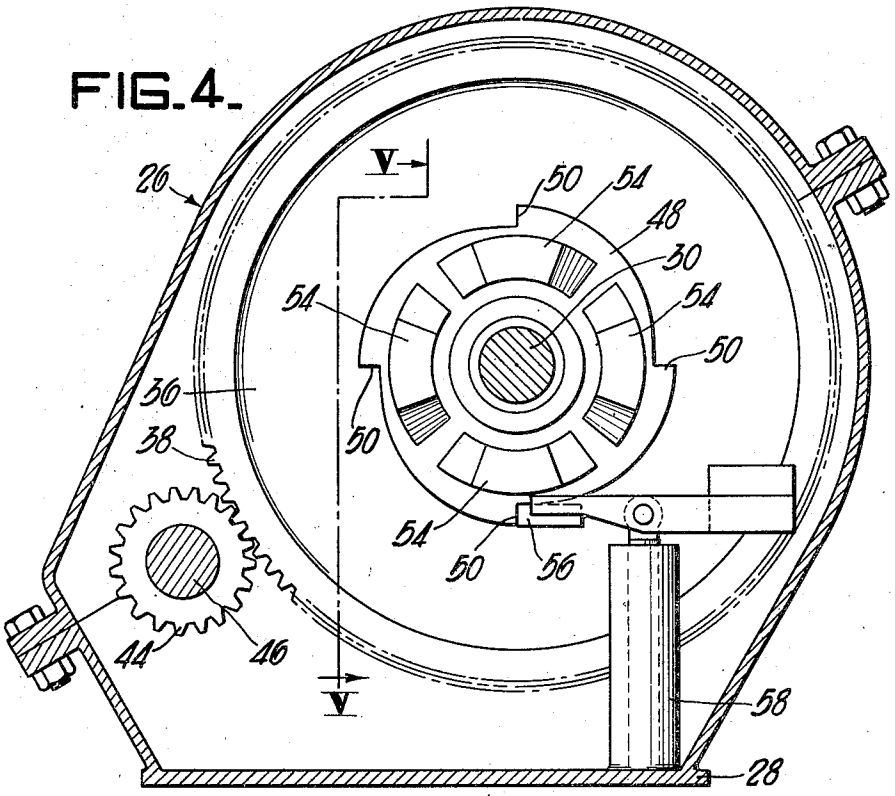
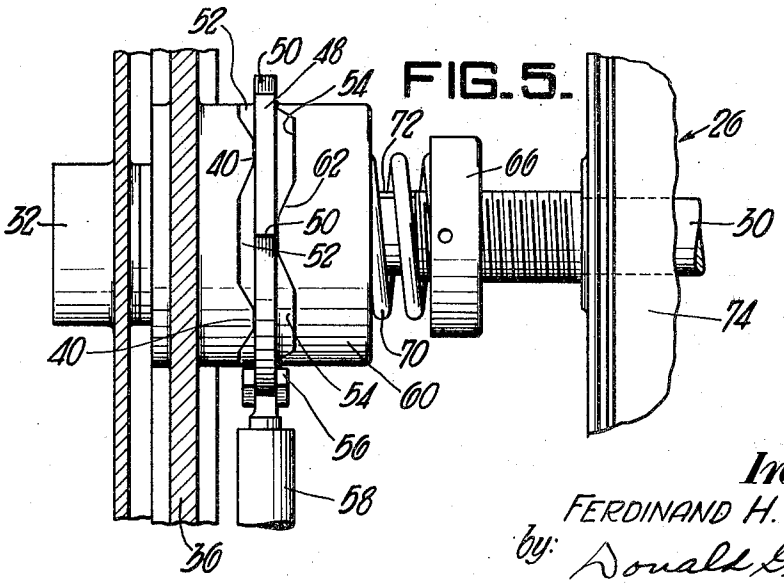


FIG. 5.



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UNITED STATES PATENT OFFICE

2,562,028

TAKE-UP REEL

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Application February 27, 1950, Serial No. 146,475

4 Claims. (Cl. 254—185)

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The present invention relates to a take-up reel and more particularly to a take-up reel for winding the magnet cable of a magnet hoisting apparatus.

Prior to my invention, one of two types of cable take-up reels was generally used for handling the magnet power cable of lifting magnets. In both types, one end of the magnet cable was connected to the lifting magnet while its other end was attached to the winding drum of a take-up reel, which reel was mounted on the hoist truck adjacent the hoist drum.

The one type of reel was connected with and positively driven by the lift hoist gearing with the speed of rotation of the take-up drum approximately equal to the lift hoist speed. When this arrangement was used, there was always present the danger of the power cable pulling apart and causing the power to the magnet to be cut off if the cable was caught on an obstruction or if it became entangled while the magnet was being lifted. Frequently, was the power cable began to pile up in layers around the take-up drum, it would travel at a rate of speed greater than that of the lift cable raising the hook block. This would cause the power cable to become taut and eventually pull apart, causing a power failure. The perilous nature of such a power failure when the magnet was lifting a load of material is obvious. Although some slack was allowed in the magnet cable in an attempt to reduce the possibility of such accidents occurring, the results were never fully satisfactory.

The second type of take-up reel in common use was one mounted adjacent the hoist mechanism but independent of any connection therewith. The drum of this reel was rotated by means of a self-contained spiral spring or springs and operated much in the same manner as the ordinary household blind roller. Continuous trouble was encountered with this type due to the frequent breakage of the springs, particularly when the reel was used on high lift hoists.

It is accordingly an object of the present invention to provide a magnet cable take-up reel which may be resiliently connected with and driven by the gearing of a hoist mechanism.

It is a further object of the present invention to provide a magnet cable take-up reel, to be used in conjunction with a hoist mechanism, which will automatically cease winding during a hoisting operation if the cable becomes taut or is otherwise impeded.

These and other objects will be more apparent after referring to the following specification and attached drawings in which:

Figure 1 is a plan view showing the reel of the invention connected with conventional hoisting apparatus;

Figure 2 is an end elevation, partly in section, of the apparatus shown in Figure 1;

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Figure 3 is a longitudinal-sectional view taken on the line III—III of Figure 2;

Figure 4 is a cross-sectional view taken on the line IV—IV of Figure 3; and

Figure 5 is an elevation, partly in section, taken on the line V—V of Figure 4.

Referring more particularly to the drawings, reference numeral 2 indicates a hoist truck mounted for travel on an overhead track 4. A hoist drum 6, having a gear 8 fixedly attached to one end thereof, is rotatably mounted on the truck. The gear 8 is driven to rotate the hoist drum by a motor 10 through pinion 12, gear 14 and pinion 16. A lift cable 18, which supports a hook block 20, is wound around the hoist drum 6. The hook block 20 supports a lift magnet 22 and is raised or lowered by rotation of the hoist drum 6. A power cable 24 is attached at one end of the magnet so as to provide energizing current thereto. The cable 24 extends upwardly from the magnet to the take-up reel which is the subject of my invention. The cable 24 is securely fixed to the hook block immediately above the magnet as at 25 so as to eliminate any strain thereon by the weight of the magnet itself.

The apparatus thus far described is conventional except for the novel magnet power cable take-up reel 26 which is mounted on a supporting plate 28 affixed to the truck 2 by means of columnar supports 9 adjacent the hoist drum 6 and which will now be described. Reference numeral 30 indicates a rotatable shaft mounted on the plate 28 with its ends supported by spaced bearings 32 and 34. A gear 36, having gear teeth 38 on its periphery and gear teeth 40 on its one face, is rotatably mounted on shaft 30 with its smooth face adjacent the bearing 32. Gear 36 is driven by the hoist drum gear 8 through pinions 42 and 44 which are keyed on a shaft 46. A ratchet 48, having notches 50 on its periphery and gear teeth 52 and 54 on its two side faces, respectively, is rotatably mounted on the shaft 30 adjacent the gear 36 with its teeth 52 in mesh with the gear teeth 40 of gear 36. A counterweighted pawl 56 is pivotally mounted adjacent ratchet 48 on a columnar stand 58 affixed at its base to the supporting plate 28. The pawl 56 cooperates with the notches 50 to prevent movement of ratchet 48 in the counterclockwise direction, as shown in Figure 4. However, the pawl 56 may be positioned to prevent movement of the ratchet in either the clockwise or counterclockwise direction, depending on the direction of rotation of shaft 30 when winding up the cable 24.

A gear 60, having gear teeth 62 on one side face and a circular groove 64 in its other face, is splined to shaft 30 adjacent ratchet 48. The teeth 62 on the face of the gear are adapted to mesh with the teeth 54 on the face of ratchet 48. A spring seat 66, having a circular groove 68 in one face thereof, is threaded on the shaft

30 and spaced from the gear 60 with its grooved face facing the grooved face of gear 60. A compression spring 70 surrounds the shaft 30 with its two ends fitted into grooves 64 and 68, respectively. Spring 70, by bearing against the threaded spring seat 66 at one end and against the splined gear 60 at its other end, acts to hold gear 60 yieldably in mesh with ratchet 48. The compressive force of spring 70 is adjusted by varying the position of the spring seat 66 in relation to the gear 60. Such adjustment is necessary to compensate for weight differences between long and short cables. If such adjustments were not made, the weight of a long cable could produce the same effect on the gearing as a cable entangled by an obstruction, that is, cause the gears to slip instead of winding up the reel. Therefore, the compressive force of the spring 70 is increased for long lengths of cable and decreased for short lengths. The splined attachment for gear 60 permits it to move axially of shaft 30 but restricts, by means of a feather key 72, its rotative movement to rotation with shaft 30. A take-up drum 74 is keyed to shaft 30 adjacent the bearing 34. One end of cable 24 is securely attached to the surface of the take-up drum 74 as at 75 so that it may be wound thereon when the shaft 30 and drum 74 rotate.

In operation, when hoisting, the driving power for the take-up reel is supplied by pinion 42 meshing with the hoist gear 8 and pinion 44 meshing with gear 36. The gearing is so proportioned that the peripheral speed of the take-up drum 74 is slightly faster than the speed of the hook block 20. This permits the take-up drum 74 to wind up the magnet cable 24 faster than the hook block lifts which causes the cable 24 to become taut. The tension thus created in cable 24 causes the teeth 62 on gear 60 to slip over one tooth space on ratchet 48. When this occurs, the tension is relieved. Each time pull on the magnet cable exceeds the compressive holding power of the spring 70, the teeth 62 on gear 60 slip over the teeth 54 on ratchet 48 and thereby eliminate all severe strain on the magnet cable. During the entire hoisting operation, pawl 56 idles over the teeth 50 on the periphery of ratchet 48.

When lowering, the pinion 44 rotates the gear 36 but the ratchet 48 is prevented from rotating by the pawl 56. Therefore, the teeth 40 on the face of gear 36 push against and slip over the teeth 52 on ratch 48 by compressing the spring 70. Thus, all the driving force between the pinion 44 and the shaft 30 is locked out automatically by the action of the pawl 56 on ratchet 48. However, since the lower end of magnet cable 24 is securely fastened to the hook block 20, the weight of the block pulls down on the magnet cable, rotating the drum 74 and shaft 30. Since gear 60 is resiliently and not rigidly in mesh with stationary ratchet 48, the teeth 62 thereon click and slip over the teeth 54 on ratchet 48.

From this description it is apparent that during the entire hoisting operation the magnet cable is resiliently pulled so that if the cable strikes a snag or is otherwise impeded it will not be drawn up taut to the breaking point.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A take-up reel for cable and the like comprising a rotatable shaft, a ratchet having teeth on its periphery rotatably mounted on said shaft, a pawl associated with said ratchet for preventing movement thereof in one direction, gear teeth on both side faces of said ratchet, a gear rotatably mounted on said shaft adjacent said ratchet, gear teeth on the face of said gear adjacent said ratchet, means for driving said gear, a second gear mounted on said shaft adjacent said ratchet on the side thereof opposite the first named gear, said second gear being splined to said shaft, gear teeth on the face of said second gear adjacent said ratchet, resilient means bearing against said second gear for yieldably holding the same in mesh with said ratchet, and a take-up drum keyed on said shaft.

2. A take-up reel as defined in claim 1 in which said resilient means includes a spring seat threaded on said shaft and spaced from said splined gear, and a compression spring surrounding said shaft with one end bearing against said splined gear and its other end bearing against said spring seat.

3. In hoisting mechanism including a hoist drum for a magnet and a take-up reel for a cable connected to the magnet, the combination comprising a rotatable shaft, a ratchet having teeth on its periphery rotatably mounted on said shaft, a pawl associated with said ratchet for preventing movement thereof in one direction, gear teeth on both side faces of said ratchet, a gear rotatably mounted on said shaft adjacent said ratchet, gear teeth on the face of said gear adjacent said ratchet, a driving connection between said hoist drum and said gear, a second gear mounted on said shaft adjacent said ratchet on the side thereof opposite the first named gear, said second gear being splined to said shaft, gear teeth on the face of said second gear adjacent said ratchet, resilient means bearing against said second gear holding the same in mesh with said ratchet, and a take-up drum keyed on said shaft.

4. In hoisting mechanism including a hoist drum for a magnet and a take-up reel for a cable connected to the magnet, the combination comprising a rotatable shaft, a ratchet having teeth on its periphery rotatably mounted on said shaft, a pawl associated with said ratchet for preventing movement thereof in one direction, gear teeth on both side faces of said ratchet, a gear rotatably mounted on said shaft adjacent said ratchet, gear teeth on the face of said gear adjacent said ratchet, a driving connection between said hoist drum and said gear, a second gear mounted on said shaft adjacent said ratchet on the side thereof opposite the first named gear, said second gear being splined to said shaft, gear teeth on the face of said second gear adjacent said ratchet, the other face of said second gear having a circular groove therein, a spring seat having a circular groove on its face threaded on said shaft with its grooved face facing said second gear, a compression spring surrounding said shaft with one end seated in the groove in said spring seat and its other end seated in the groove of and bearing against said second gear for yieldably holding the second gear in mesh with said ratchet, and a take-up drum keyed on said shaft.

FERDINAND H. H. FOSS.

No references cited.

Certificate of Correction

Patent No. 2,562,028 July 24, 1951

FERDINAND H. H. FOSS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 22, for "was" read *as*; column 2, line 30, for "9" read *29*; column 3, line 54, for "ratch" read *ratchet*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of October, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.