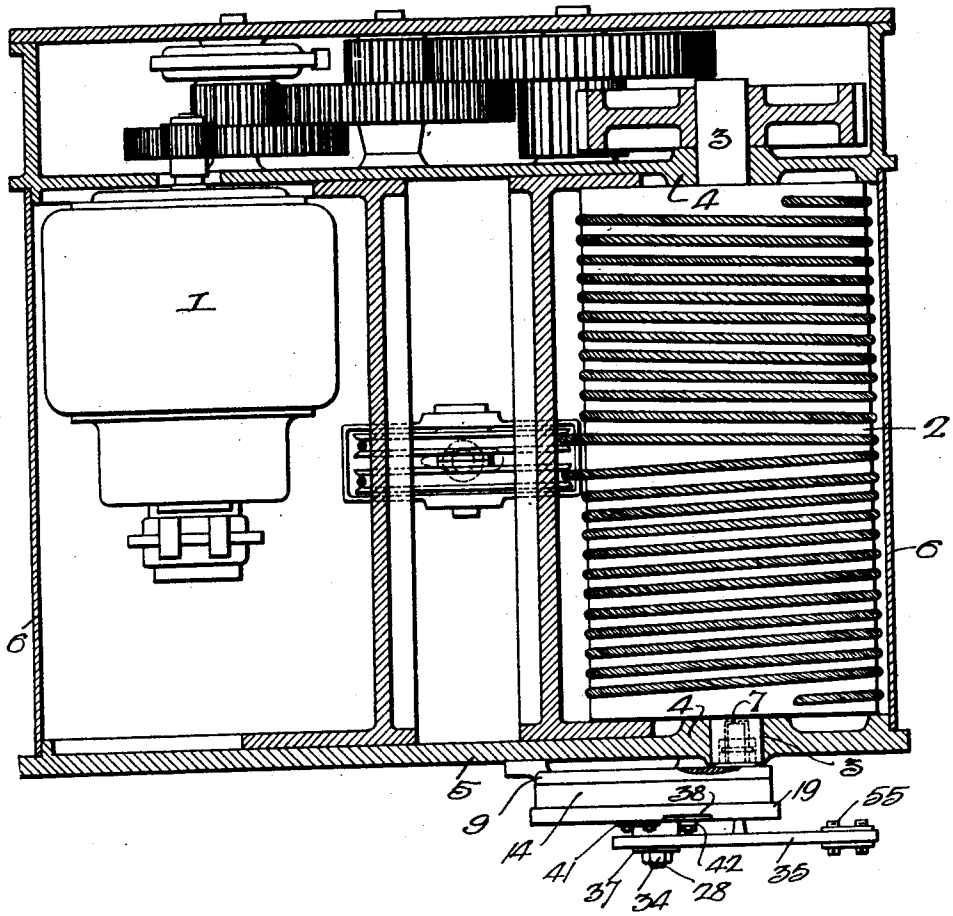
May 22, 1928. 1,670,918

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ADJUSTABLE HOIST LIMIT STOP MECHANISM

Filed Dec. 8, 1925 4 Sheets-Sheet 1

Fig. 1.



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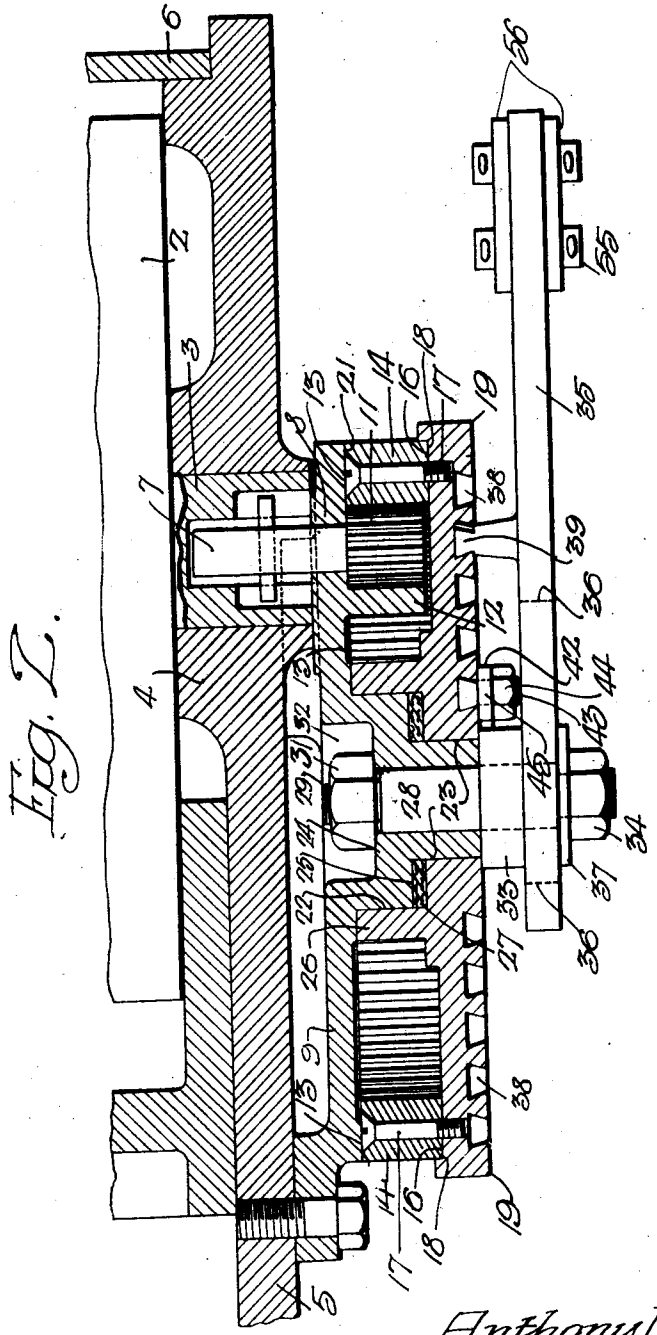


Fig. 2.

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ADJUSTABLE HOIST LIMIT STOP MECHANISM

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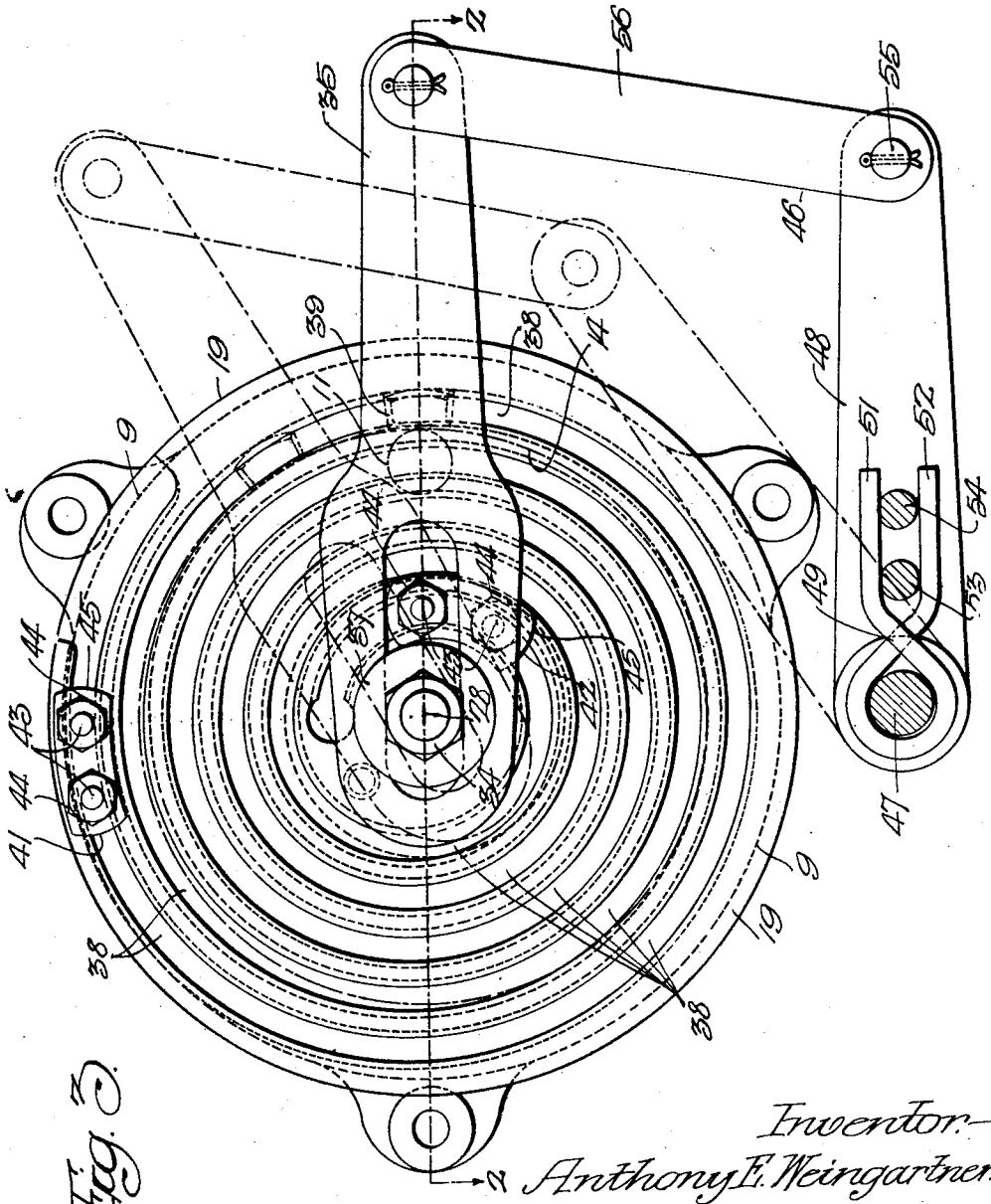


Fig. 5.

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Fig. 5.

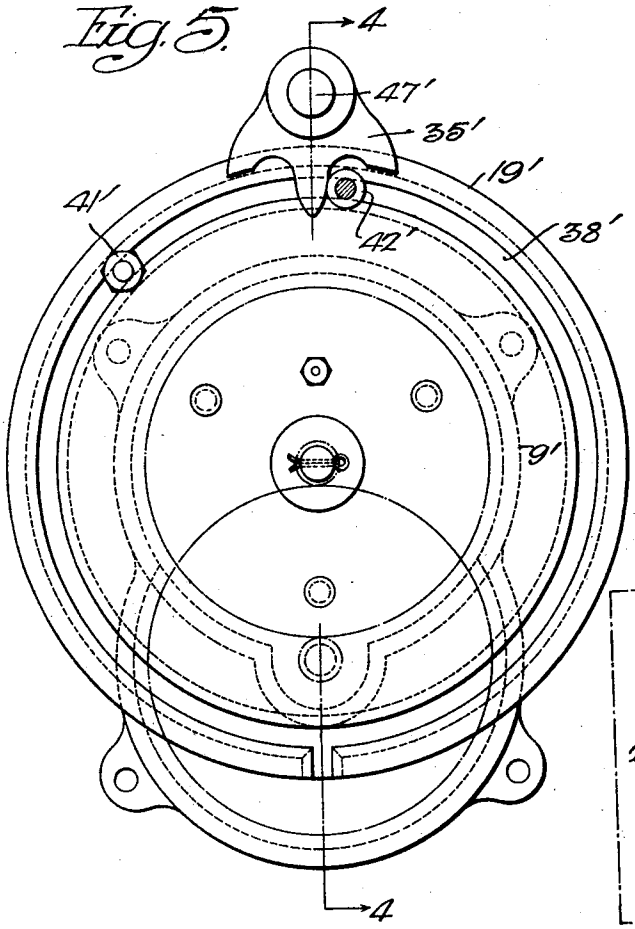
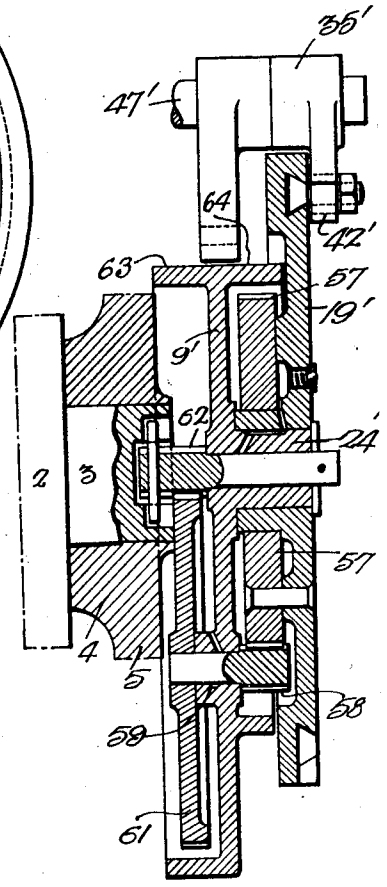


Fig. 4.



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Patented May 22, 1928. 1,670,918

UNITED STATES PATENT OFFICE.

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ADJUSTABLE HOIST LIMIT STOP MECHANISM.

Application filed December 8, 1925. Serial No. 74,140.

My invention relates to stop mechanism and particularly to control-means for hoisting apparatus.

One object of my invention is to provide stop mechanism for hoists that shall have a maximum adjustment for a minimum movement of hook travel.

Another object of my invention is to provide mechanism that shall automatically stop the hoisting gear when the hook has reached a predetermined upper or lower position.

A further object of my invention is to provide trip mechanism that shall comprise a driving member having a spiral groove and one or more stops, a tripping lever interlocked with said groove and so mounted as to be movable with said driving member only when actuated into engagement with one of said stops, and a transmission lever movable from a neutral position only when said tripping lever engages said stop.

My invention, however, may best be understood by referring to the accompanying drawings, wherein:

Fig. 1 is a view, partially in elevation and partially is horizontal section, of one form of embodiment of my invention;

Fig. 2 is an enlarged detail horizontal sectional view of the stop mechanism shown in Fig. 1;

Fig. 3 is an elevational view of the trip mechanism shown in Fig. 2;

Fig. 4 is a view similar to Fig. 2, but showing a modification; and

Fig. 5 is an elevational view of the mechanism shown in Fig. 4.

For purposes of illustration, I have shown my invention in connection with a monorail hoist of the type disclosed in the patent to H. S. Valentine, No. 1,455,369, wherein an electric motor 1 drives a drum 2 that is mounted on a shaft 3 journaled in bearings 4 carried by end walls 5 of a housing 6. In accordance with my invention, the shaft 3 may be detachably connected to a shaft section 7 (Figs. 2 and 6) which extends through a bearing 8 formed in a main supporting bracket 9 secured to the end wall 5 of the housing 6.

A pinion 11 is mounted on the end of the shaft 7, one side thereof, being protected by a flange 12 projecting from an inner face 13 of the supporting bracket 9. The pinion 11 meshes with an internal gear-wheel 14, one face 16 of which is secured by bolts 17 to an adjacent face 18 of a cam disk 19. An opposite face 21 of the gear-wheel 14 is positioned immediately adjacent to the inner face 13 of the supporting bracket 9. Under some conditions of manufacture, it may be desirable to form the gear-wheel 14 and the cam disk 19 from an integral casting.

The disk 19 may be rotatably mounted on bearings 22 and 23 provided by a central hub 24 of the bracket 9. The portion of the hub 24 defining bearing 23 is of reduced diameter with respect to that defining bearing 22, forming an annular shoulder 25. The bearing 22 may be engaged by an annular flange 26 that extends from the disk 19. Oiled felt packing 27 is preferably positioned in the space between the annular shoulder 25 and the adjacent portion of the disk 19.

The disk 19 may be held on the bearings 22 and 23 by means of a bolt or pivot pin 28, one end 29 of which is threaded to receive a nut 31 that is positioned in a countersunk portion 32 of the supporting bracket 9. A clamping washer 33 engages the exposed face of the disk 19 and may be secured by means of a nut 34. A trip lever 35 is mounted on the pivot pin 28 so as to be movable across the exposed face of the disk 19 by providing an elongated slot 36 in one end thereof. This end of the trip lever 35 is positioned intermediate the washer 33 and the nut 34, whereby the disk 19 as well as the trip lever 35 may be held in position by common means. A washer 37 may also be inserted intermediate the nut 34 and the adjacent side of the trip lever 35.

The longitudinal movement of the trip lever 35 across the exposed face of the disk 19 may be effected by means of a spiral groove 38 and a cam lug 39 which extends from said trip lever into the groove 38.

The portion of the lug 39 positioned in the groove 38 as well as the groove itself are so formed as to provide a slidable dovetail connection therebetween, whereby the trip lever 35 and disk 19 may be interlocked but relatively movable. A pair of control stops 41 and 42 are positioned in the tapered groove 38 on opposite sides of the trip-lever lug 39. Each stop may comprise a pair of bolts 43, the heads of which are interlocked

with the groove 38, as in the case of the cam lug 39. Nuts 44 are mounted on the upper ends of the bolts 43, whereby a stop plate 45 may be clamped against the face of the disk 19.

The gear reduction between the pinion 11 and the internal gear-wheel 14 and the number of convolutions of the spiral groove 38 are such that the cam lug 39 does not reach either end of said spiral groove until the hoisting hook is in its extreme position. Since the longitudinal movement of the lug 39 across the face of the disk 19 is interrupted at this point, the further rotation of said disk 19 causes the tripping lever 35 to turn with the disk 19, all as will appear more fully hereinafter.

My invention further contemplates linkage 46, whereby a member 47, which may be connected to a switch, brake or other control mechanism, may be unaffected by the lateral movement of the tripping lever 35 across the face of the grooved disk 19 and actuated only when the cam lug 39 of the tripping lever 35 engages one or the other of the stops 41 and 42. In the present instance, the member 47 is operatively associated with a control switch (not shown) for the hoist. The linkage 46 comprises a transmission lever 48 having one end rigidly secured to the control member or shaft 47. The lever 48 may be yieldingly held in a neutral position by means of a spring 49 which encircles the shaft 47 and terminates in end portions 51 and 52 respectively positioned on opposite sides of pins 53 and 54 carried by the lever 48 and a stationary support (not shown).

When the transmission lever 48 is actuated from the solid-line position shown in Fig. 3 to the dot-and-dash line position, the pin 54 engages the spring end portion 51, the opposite end portion 52 being retained in position by the stationary pin 53. When the transmission lever 48 is actuated in the opposite direction from the mid-position shown in Fig. 3, the spring end portion 52 is engaged by the pin 54 and the spring end portion 51 is held by the pin 53. Thus, the transmission lever 48 as well as the control shaft 47 are yieldingly held in the neutral solid-line position illustrated in Fig. 3.

The remaining end of the transmission lever 48 affords a pivotal mounting 55 for a connecting link 56, an opposite end of which is pivotally mounted on the end of the tripping lever 35. The pivotal mounting 55 thus constitutes a fulcrum for the link 56 as it is swung back and forth by the movement of the tripping lever 35 across the face of the grooved disk 19, the transmission lever 48, however, being substantially unaffected by such movement.

Assuming the apparatus to be in the solid-line position shown in Fig. 3, wherein the hoisting hook is almost in its maximum elevated position, the continued movement of the drum 2 causes the outer stop 41 to be actuated into engagement with the cam lug 39 of the tripping lever 35, whereupon the latter is moved vertically into the dot-and-dash line position. This movement is transmitted through the link 56 and the lever 48 to the shaft 47, with the result that the control switch (not shown) for the motor 1 is opened and the apparatus as a whole accordingly brought to rest.

When the motor switch in question is closed by the usual operating means (not shown), the cam disk 19 is actuated in the opposite direction, causing the hoisting hook to be lowered until the inner stop 42 is actuated into engagement with the lug 39 of the tripping lever 35 to cause the latter as well as the linkage 46 and control shaft 47 to move in the opposite position. The motor control switch is then opened with the result that the driving motor 1 is again rendered inoperative and winding drum 2 brought to rest. The hoisting hook is now in its lowest position.

When it is desired to vary the travel of the hoisting hook within the maximum limits just defined, the stops 41 and 42 are moved in the groove 38 to such positions as bring about this desired result. Inasmuch as the cam disk 19 turns through a large angle for a relatively small movement of the hoisting hook, such adjustments may be made with very great accuracy.

My invention is capable of various modifications as shown, for example, in Figs. 4 and 5, wherein a disk 19′ is provided with a circular tapered groove 38′ having adjustable stops 41′ and 42′ respectively movable into engagement with a projecting portion 39′ of a lever 35′ pivoted on a shaft 47′ which is connected to a switch, brake drum or other control mechanism. The disk 19′ is rotatably mounted on a hub 24′ of a bracket 9′ and it carries on its inner side a gear-wheel 57 which meshes with a driving pinion 58 journaled in a bearing 59 provided in the supporting bracket 9′. The pinion 58′ may be actuated by a gear-wheel 61 which meshes with a driving pinion 62 detachably secured to the drum operating shaft 3. The bracket 9′ is provided with an annular flange 63 which encircles the gear-wheels 61 and 62 and abuts against the end wall 5 of the hoist frame 6. The supporting bracket 9′ is also provided with an oppositely extending annular flange 64 which encloses the gear-wheels 57 and 58. The gear reduction between the shaft 3 and the gear-wheel 57 is such that the entire range of operation of the hoisting drum 2 occurs for one revolution of the disk 19′. Variations within this maximum may be made by properly setting the stops 41′ and 42′. The

operation of this mechanism is otherwise as set forth in connection with the description of Figs. 1 and 2.

While I have shown two forms of embodiments of my invention, it is apparent that various changes and modifications may be made therein without departing from the spirit of my invention and I desire, therefore, that only such limitations shall be imposed thereon as are indicated in the appended claims or as are demanded by the prior art.

I claim:

1. Stop mechanism comprising a driving member, a driven member having a lost-motion connection therewith, a member yieldably held in a neutral position, means for so operatively associating said last-mentioned member and said driven member that the former is actuated from said neutral position when said driving and driven members assume a predetermined relation to each other, and an adjustable stop for controlling the time of operation of said third-mentioned member.

2. Mechanism of the character described comprising a driving member, a driven member having such lost-motion connection therewith that said driven member may be moved bodily within predetermined limits and thereafter actuated in the direction of movement of said driving member, a third member, and means for so operatively associating said third member and said driven member, that the former is actuated only during one of the movements of said driven member.

3. In a stop mechanism for hoists, the combination with a winding drum and a driven member having a groove provided with a shoulder, of means for controllling the operation of said drum comprising a trip lever mounted for different movements and having one portion thereof in operative relation to said shoulder, a transmission lever, and a link for interconnecting said levers, said transmission lever constituting a fulcrum for said link during one of the movements of said trip lever.

4. Means having a bearing, a driving member rotatably mounted thereon, a driven member having a lost-motion connection with said driving member, a gear-wheel interposed between said driving member and said bracket, an element to be controlled, and means for operatively associating said driven member and said element whereby the former may have a predetermined movement independently of the latter.

5. In a stop mechanism, the combination with a bracket having a hub constituting a bearing, of a plate mounted on said bearing and provided with control stops, an internal gear-wheel positioned intermediate said bracket and said plate and secured to the latter, and a driving pinion for said internal gear-wheel supported by said bracket.

6. A rotatable member having a spiral groove, a member having a portion extending into said groove so as to be actuated thereby, a member yieldably held in a neutral position, and means for connecting said last-mentioned member and said second-mentioned member, whereby the latter may be actuated independently of the former within predetermined limits.

7. Apparatus comprising a member mounted for longitudinal and rotary movements, means for actuating said member longitudinally during a predetermined interval and thereafter rotatably, an element to be controlled, and a link for operatively associating said element with said member whereby said element is actuated only during said rotary movement, said link pivoting about said element during said longitudinal movement.

8. A rotary member having a spiral groove, a pivot pin, a lever having a slot adapted to receive said pivot pin, said lever having one portion thereof extending into said groove, a transmission lever, and means for connecting said levers.

9. Apparatus of the character described comprising a driving member provided with a spiral groove and at least one adjustable stop, and a trip lever interlocked with said groove so as to be moved successively in different directions.

10. Means having a hub providing a bearing, a member mounted on said bearing having a spiral groove, a pivot pin extending from said hub and a trip lever provided with a slot for receiving said pin, said trip lever being interlocked with said spiral groove.

11. Means having a bearing, a member provided with a spiral groove mounted on said bearing, a trip lever, and a common pivot pin for positioning said trip lever and said member, said trip lever having such connection with said groove as to be actuated transversely of said member for a predetermined movement thereof and thereafter with said member.

12. Apparatus comprising a movable member having a spiral groove, a trip lever having a slot, means including a common element for positioning said member and said trip lever, a yieldably-held transmission lever, and a link for connecting said levers.

13. Apparatus of the class described comprising a bracket having a hub, a member mounted on said hub and provided with a spiral groove on one face thereof, a stop for said groove, a trip lever having one portion thereof interlocked with said groove so as to be movable across the face of said member until said portion engages said stop, and

a yieldably-held transmission lever so associated with said tripping lever as to be actuated only upon said engagement.

14. Stop mechanism comprising a bracket having a hub constituting a bearing, a member mounted on said bearing and provided with a spiral groove having a stop, a gear-wheel for actuating said member and for enclosing said bearing, a trip lever, common means for positioning said member and for supporting said trip lever, whereby the latter may be actuated upon the movement of said member, transversely thereof and thereafter bodily therewith, a yieldably-held transmission lever, and means for so operatively associating said levers that said transmission lever is responsive to at least one of the movements of said trip lever.

15. In combination, a driving member, a driven trip lever having such lost-motion connection therewith that said trip lever may be moved bodily within predetermined limits and thereafter actuated in the direction of movement of said driving member, a transmission lever, and a link for operatively associating said levers, whereby said transmission lever is actuated only during one of the movements of said trip lever.

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