

Feb. 27, 1934.

C. V. HALLENBECK

1,949,015

CONTROLLING MECHANISM FOR WINDING DRUMS

Filed March 10, 1932

6 Sheets-Sheet 1

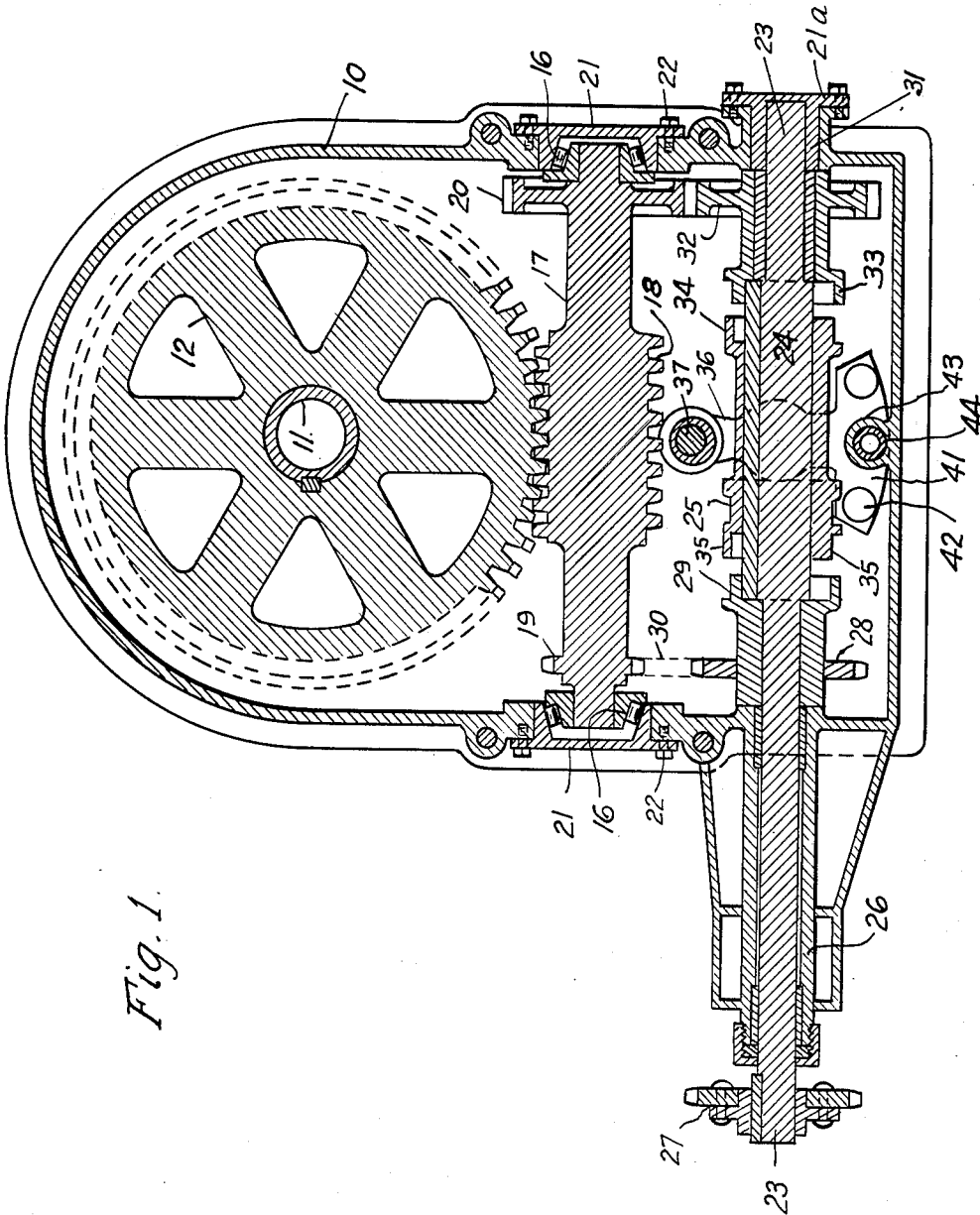


Fig. 1.

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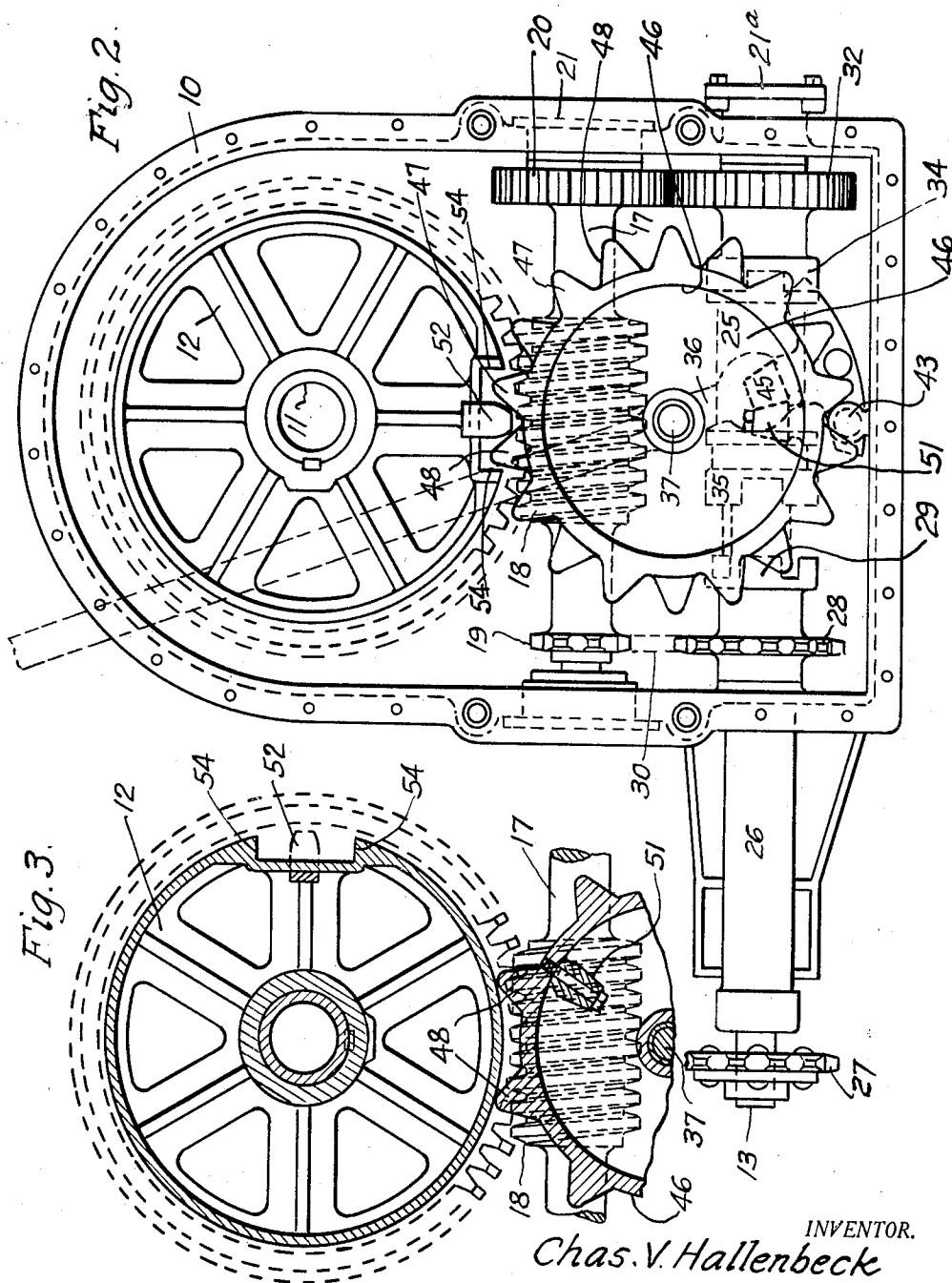
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6 Sheets-Sheet 2



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6 Sheets-Sheet 3

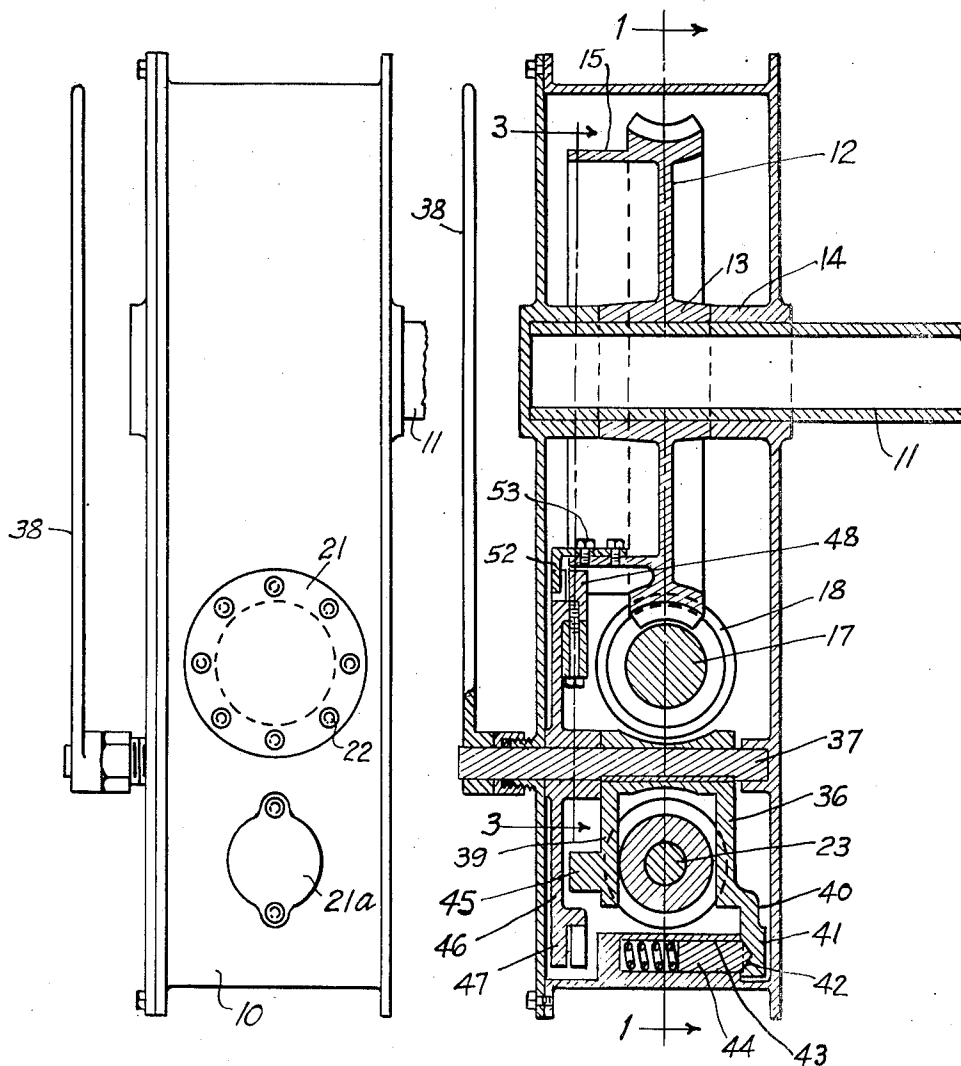


Fig. 4.

Fig. 5

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Fig. 6.

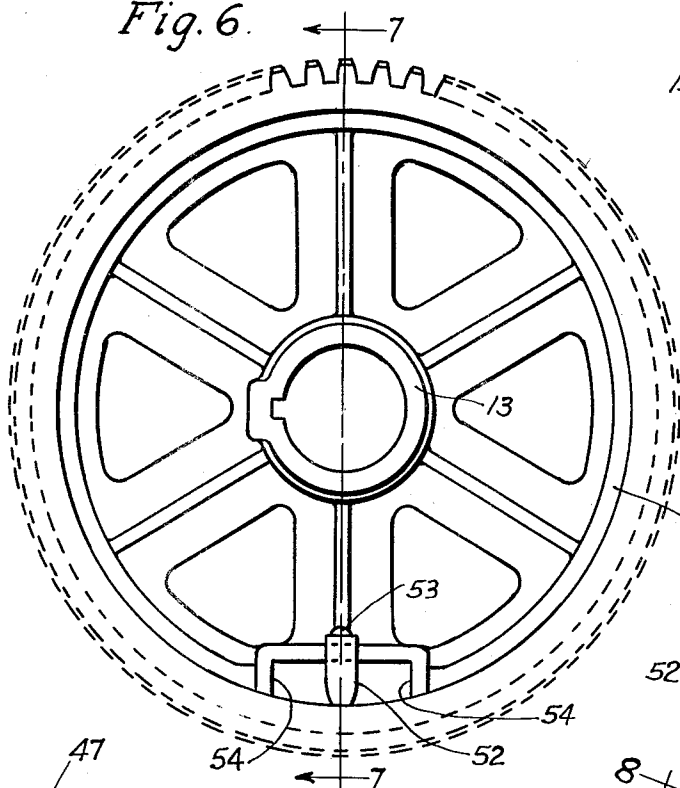


Fig. 7.

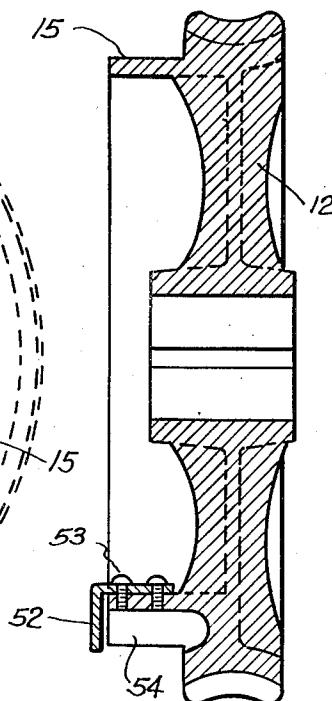


Fig. 8.

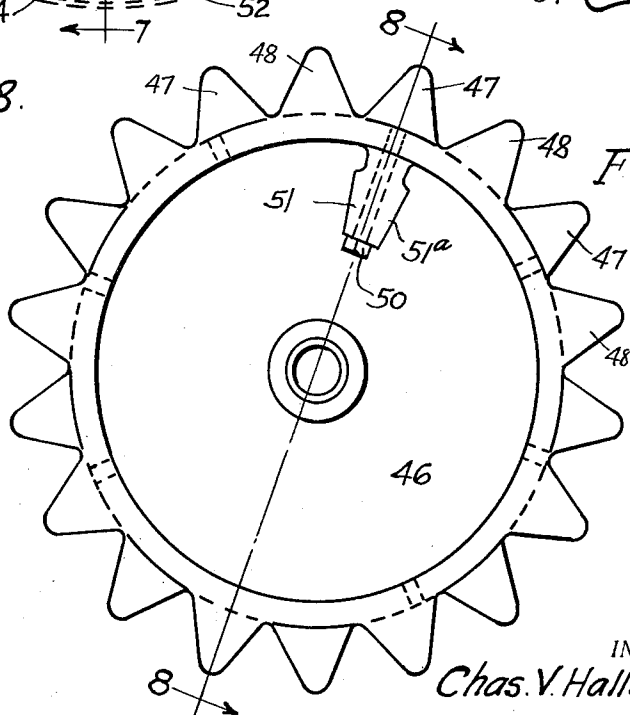
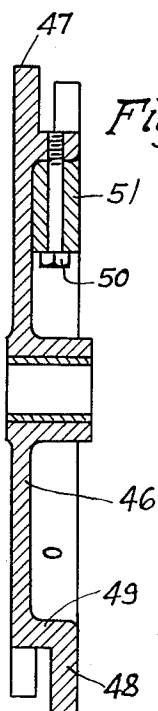


Fig. 9.

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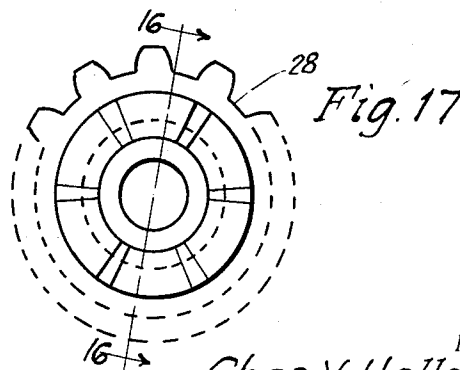
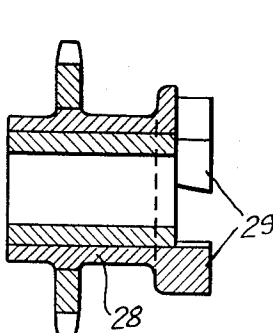
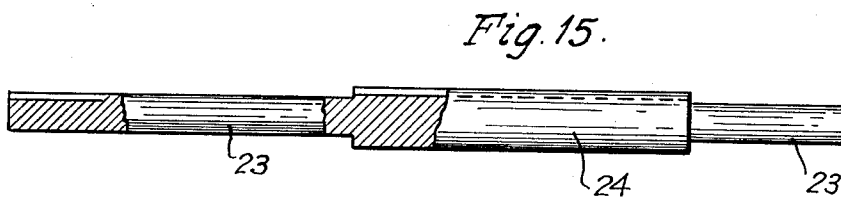
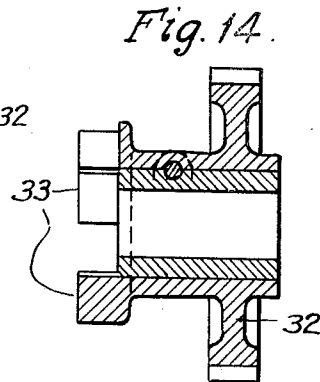
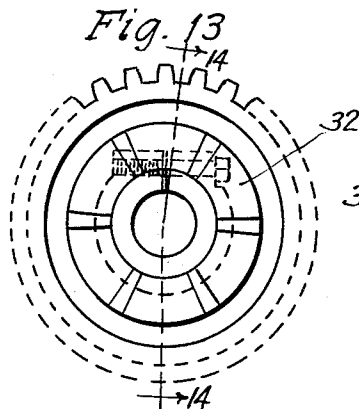
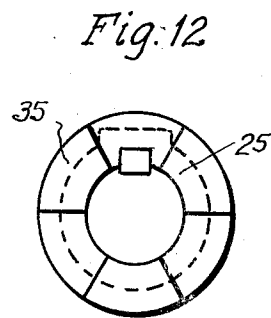
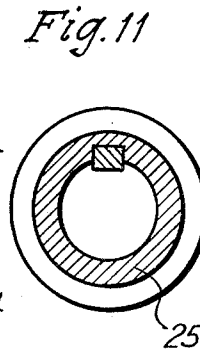
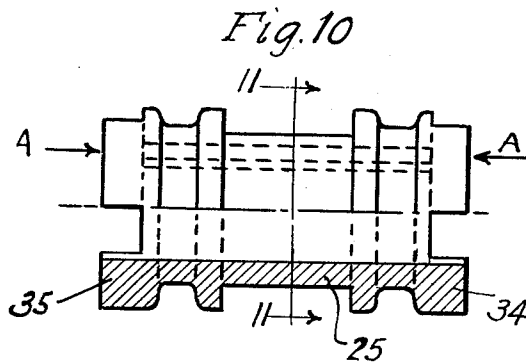
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6 Sheets-Sheet 5



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CONTROLLING MECHANISM FOR WINDING DRUMS

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Fig. 18

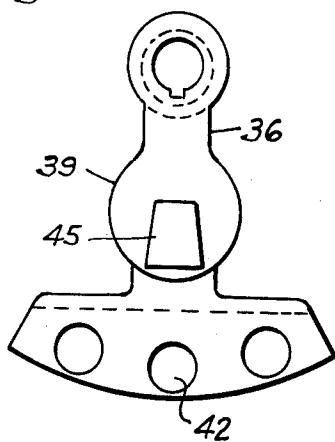


Fig. 19

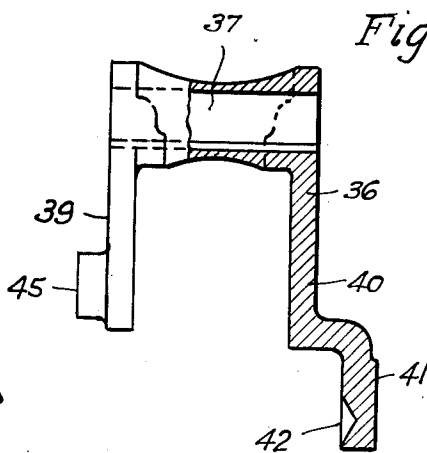
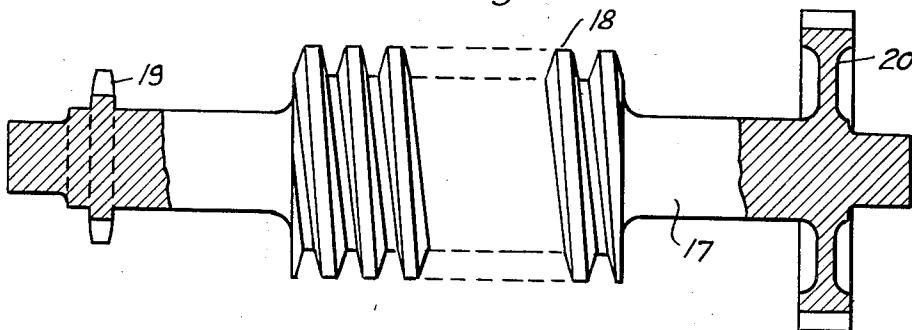


Fig. 20



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UNITED STATES PATENT OFFICE

1,949,015

CONTROLLING MECHANISM FOR WINDING DRUMS

Charles V. Hallenbeck, Denver, Colo.

Application March 10, 1932. Serial No. 598,039

1 Claim. (Cl. 192—138)

This invention relates to driving and controlling mechanisms for hoisting machines such as winding drums and the like and particularly to the means whereby application of power to an operating shaft, such as is used either for carrying or rotating a winding drum, is secured and controlled.

An object of the invention is to provide manually controllable means whereby the power may be applied to rotate the shaft, as for instance, a drum shaft in one direction or the other, the mechanism being so constructed that the shaft is locked against movement when the controlling means is disposed in a neutral position.

A further object is to provide means acting automatically to shift the controlling means to its neutral position when the shaft has made a predetermined number of revolutions either in one direction or the other and in this connection to provide an automatic mechanism for this purpose which includes a rotatable clutch shifting member which is given a step-by step rotation and specifically given a rotation of one step for each complete rotation of the winding shaft.

A further object in this connection is to provide means which are adjustable for this purpose so that the clutch may be shifted to its neutral position at any desired point.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view through the housing of the driving mechanism and substantially on the line 1—1 of Figure 5;

Figure 2 is a side elevation of the winding mechanism and its controlling means, the front wall of the housing being removed;

Figure 3 is a section taken on the line 3—3 of Figure 1;

Figure 4 is an end elevation of the housing for the driving mechanism;

Figure 5 is a section on the line 5—5 of Figure 2;

Figure 6 is a front elevation of the worm wheel;

Figure 7 is a section on the line 7—7 of Figure 6;

Figure 8 is a section on the line 8—8 of Figure 9, Figure 9 being an elevation of the step by step gear which controls automatically the action of the clutch;

Figure 10 is a front elevation partly in section of the clutch sleeve;

Figure 11 is a section on the line 11—11 of Figure 10;

Figure 12 is an end elevation of the clutch sleeve;

Figure 13 is an elevation of the clutch driving gear;

Figure 14 is a section on the line 14—14 of Figure 13;

Figure 15 is an elevation of the driving shaft partly in section;

Figure 16 is a section on the line 16—16 of Figure 17;

Figure 17 is an end elevation of the driving clutch sprocket;

Figure 18 is an end elevation of the clutch shifting lever;

Figure 19 is a side elevation partly in section thereof;

Figure 20 is an elevation partly in section of the worm drive shaft, the fixed sprocket and gear wheel being shown in section;

Referring to Figures 1, 2, and 5, 10 designates a housing into which extends one end of a driven shaft 11, this shaft carrying upon it the worm wheel 12. The hub 13 of this worm wheel is held in spaced relation to the side walls of the housing by the inwardly projecting hub portions 14 on these side walls. The worm wheel 12 as shown in Figure 5 is provided with the annular, laterally extending rim 15 for a purpose which will be later stated. Mounted in bearings 16 in the end walls of the housing is a worm shaft 17 carrying on it the worm 18. This shaft has mounted on it or integral with it at one end the sprocket wheel 19 and at the other end carries the gear wheel 20 which may be integral with the shaft.

The sprocket wheel 19 and the gear wheel 20 are shown as integral with the shaft 17 but I do not wish to be limited to this as obviously they might be keyed on the shaft or otherwise attached thereto. As illustrated the extremities of the shaft are mounted in anti-friction bearings, the outer cones of which are carried upon the detachable cover plates 21 held in place by screws 22.

Extending parallel to the worm shaft 17 is a countershaft 23. This shaft at its middle is enlarged as at 24, this enlargement being provided with a key-way or being formed with a spline. Mounted upon the enlarged portion of this shaft is a sliding clutch sleeve 25 as shown most clearly in Figure 1. One end of this shaft is mounted in an elongated bearing 26 and the outer end of the shaft carries upon it the sprocket or gear wheel 27 whereby power may be applied to the shaft to rotate it.

Between the bearing 26 and the enlarged middle portion 24 of the shaft is loosely mounted

the sprocket wheel 28, the hub of which is formed with the clutch teeth 29 at one end. This sprocket wheel 28 has driving connection with the shaft 17 through the sprocket chain 30 which engages with the sprocket wheel 19. The other end of the shaft 23 carries upon it the supporting sleeve 31 and loosely surrounding this sleeve is the hub of the gear wheel 32 which meshes with the gear wheel 20 on the shaft 17. The hub of this gear wheel 32 at its inner end is provided with clutch teeth 33. The sleeve 25 is provided at its opposite end with clutch teeth 34 and 35 to engage with the clutch teeth 33 and 29 respectively and it will be obvious now that when the clutch sleeve is shifted to the left in Figure 1, driving connection will be provided between the shaft 24, the sprocket wheel 28 and the sprocket wheel 19, thus securing a rotation of the shaft 17 in the same direction as the shaft 24 whereas when the clutch sleeve 25 is shifted from its neutral position toward the right in Figure 1, driving connection will be formed between the shaft 23, the gear wheel 32 and the gear wheel 20 which will cause a reverse rotation of the shaft 17. Obviously when the clutch sleeve 25 is disposed in its neutral or intermediate position, the shaft may rotate but will not have any driving connection with the shaft 17 and thus the driven shaft will be held from movement by the teeth of the worm 18 acting on the teeth of the gear wheel 12.

For the purpose of manually and also automatically shifting the clutch sleeve 25, I provide a shifter yoke designated generally 36, this being mounted upon a shaft 37 carrying a handle 38 as shown in Figures 4 and 5. The yoke 36 is formed to provide two downwardly extending arms 39 and 40. The arm 40 is offset and downwardly extended at its lower end at 41 (see Figures 5 and 19) and this downwardly extending end is laterally elongated as shown in Figure 18 and formed upon its inner face with a plurality of sockets 42. Mounted within a casing 43 formed at the lower end of the housing as shown in Figure 5 is a spring projected bolt 44 having a rounded or slightly conical tip which is engageable within the shallow recesses 42 and acts to detain the clutch shifting yoke at any one of its three positions. The arm 39 of the clutch shifting yoke is formed upon its outer face with the outwardly projecting lug 45, the sides of which are upwardly and inwardly inclined as shown best in Figure 18.

It is obvious that by shifting the lever 38 from its neutral position in one direction or the other, the clutch sleeve 25 will be shifted from a neutral position to one position or another and thus the gear wheel 12 with the shaft 11 will be rotated in one direction or the other or if the shifting lever be brought to a neutral position, the gear wheel 12 will cease its rotation. Thus the direction of rotation of the winding drum, if the winding drum is mounted upon the shaft 11, is manually controlled by the shifting lever 38.

It is oftentimes desirable and in some cases necessary to provide means for automatically shifting the clutch from one or the other of its engaged position to its neutral position to thus stop the movement of the main shaft and the winding drum thereon. This is particularly necessary where this mechanism is used in hoists, for throwing out the clutches and making the hoist inoperative at given points usually at the extreme upper or lower positions where the danger of overwinding is particularly imminent. For

the purpose of securing this automatic disengagement of the clutch and shifting it to a neutral position, I have provided a gear wheel 46 shown in detail in Figures 8 and 9, this gear wheel being mounted for free rotation upon the shaft 37 as shown in Figures 5 and 6 and this gear wheel revolving in front of the annular flange 15 of the worm wheel 11. The wheel 46 is intended to be given a step by step rotation and I will hereafter refer to it as the "step by step" wheel. This wheel 46 on its periphery is provided with a set of outwardly projecting teeth 47, these teeth being preferably somewhat triangular in form with rounded apices.

These teeth 47 are separated from each other by a distance approximately equal to the base of a tooth. Also carried upon the periphery of the wheel 46 is a second series of teeth 48 which are disposed in staggered relation to the teeth 47 and inward of these teeth as best shown in Figure 8. These teeth 48 are also separated from each other by a distance equal to the base of one tooth. The flange 49 which constitutes the rim of the wheel 46 has attached to its inside face by a bolt 50 the lug 51 as shown in Figures 8 and 9, this lug 51 having downwardly and centrally inclined side faces 51a, these side faces being complementarily inclined with reference to the lug 45 on the clutch sleeve shifting yoke. This lug 45 is disposed in the path of motion of the inwardly projecting lug 51 so that when the wheel 46 has made nearly a complete rotation, the lug 51 will engage against the lug 45 and shift the yoke to thereby shift the clutch sleeve from one position or another to a neutral position. For the purpose of giving a step by step rotation to the wheel 46, the worm wheel 12 is provided with the annular flange 15 as heretofore referred to. At one point in the periphery of this wheel, there is provided a radially projecting lug or finger 52, the extremity of which is rounded as shown best in Figure 6. This lug is angular in cross section so as to provide a flange fitting beneath the flange 15 and held thereto by the screws 53. The rim 15 is interrupted at each side of this lug 52 and formed to provide opposed walls 54 as shown in Figure 6.

As the worm wheel rotates, the lug 52 will be gradually carried around until eventually it engages against one of the teeth 47 as shown in Figure 2, while one of the walls 54 will engage against one of the teeth 48. Thus upon the further rotation of the worm wheel, the wheel 46 will be given a one step rotation and then will remain stationary until the lug 52 again, after a complete rotation of the worm wheel, comes in contact with another of the teeth 47 until nearly a complete rotation will be given to the wheel 46, or, in other words, the lug 51 will engage against the lug 45 and shift the clutch sleeve from its engaged position to a neutral position. Thus in Figure 2, assuming that the wheel 46 is moving in a clockwise direction, the lug 51 will move through nearly an entire circle with the wheel 46 until it comes again in contact with the lug 45 and will then shift the clutch sleeve to its neutral position from the position shown in Figure 2, thus bringing the driving mechanism to a standstill.

I do not wish to be limited to the use of one of the lugs 51 upon the wheel 46 as there may be more than one of these lugs which will act to stop the operation of the mechanism at a predetermined point.

It will be noted that the teeth 47 and the

teeth 48 are such a distance apart that a sufficient space is left to permit of the manually actuable lever shifting the wheel 46 in a reverse direction at the time when the clutch is shifted so as to permit the machine to be started manually after it has been automatically stopped.

It will be seen that this mechanism is particularly applicable to hoisting drums such as are used on trucks or for material elevators or the like. Such a hoisting drum may be used on freight or passenger elevators or anywhere where a hoist may be employed. While I have described this mechanism as being particularly applicable to the control of hoisting shafts, I do not wish to be limited thereto as it might be applied to the control of other shafts. Neither do I wish to be limited to the exact details of construction as these obviously might be modified in many different ways without departing from the spirit of the invention as defined in the appended claim.

It will be seen that I have provided a safety means for tripping the load at any given point and a self-locking means holding the winding drum at any point through the action of the worm on the worm wheel. Thus when the clutch shifting lever is in a neutral position, the hoist is inoperative, that is, the winding drum and shaft are held from any rotation in either direction because of the engagement of the worm with the worm wheel. By shifting the lever to the raising or lowering position, the winding shaft will rotate in the direction selected until either the automatic stop comes into engagement with the lug on the shifting lever or the shifting lever is manually shifted. The fact that when the shift-

ing lever is in neutral position, the hoisting shaft is held positively from any movement is a very important one. It is additionally to be noted that the main drive is all in one direction and is not reversed, a reversal of the shaft of the winding drum being secured by shifting the clutch. The automatic stop 51 is adjustable so that it can be set at exactly the right position to trip. While I have shown only one automatic stop or trip, two or more can be used, if desired.

I claim:—

A mechanism of the character described, comprising a driven shaft, oppositely disposed gear elements thereon, a parallel driving shaft, oppositely disposed gear elements loose thereon and having direct and reverse driving engagement with the gear elements on the driven shaft, a clutch sleeve longitudinally shiftable on the driving shaft and adapted to have clutching engagement with one or the other of the gear elements on the driven shaft, a lever having operative engagement with the clutch sleeve, and means for automatically shifting the clutch sleeve to a neutral position after the driving shaft has made a predetermined number of revolutions including a wheel means for rotating said wheel one step upon a predetermined movement of the driven shaft, the axis of the wheel being coincident with the axis of oscillation of the lever, the lever having a lug and the wheel having a lug adapted after a predetermined rotation of the wheel to engage the lug on the lever and shift the lever to thereby shift the sleeve to a neutral position.

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