Oct. 4, 1949. W. M. BROWN 2,483,688

LEVEL WINDING DRUM

Filed July 24, 1945 3 Sheets-Sheet 1

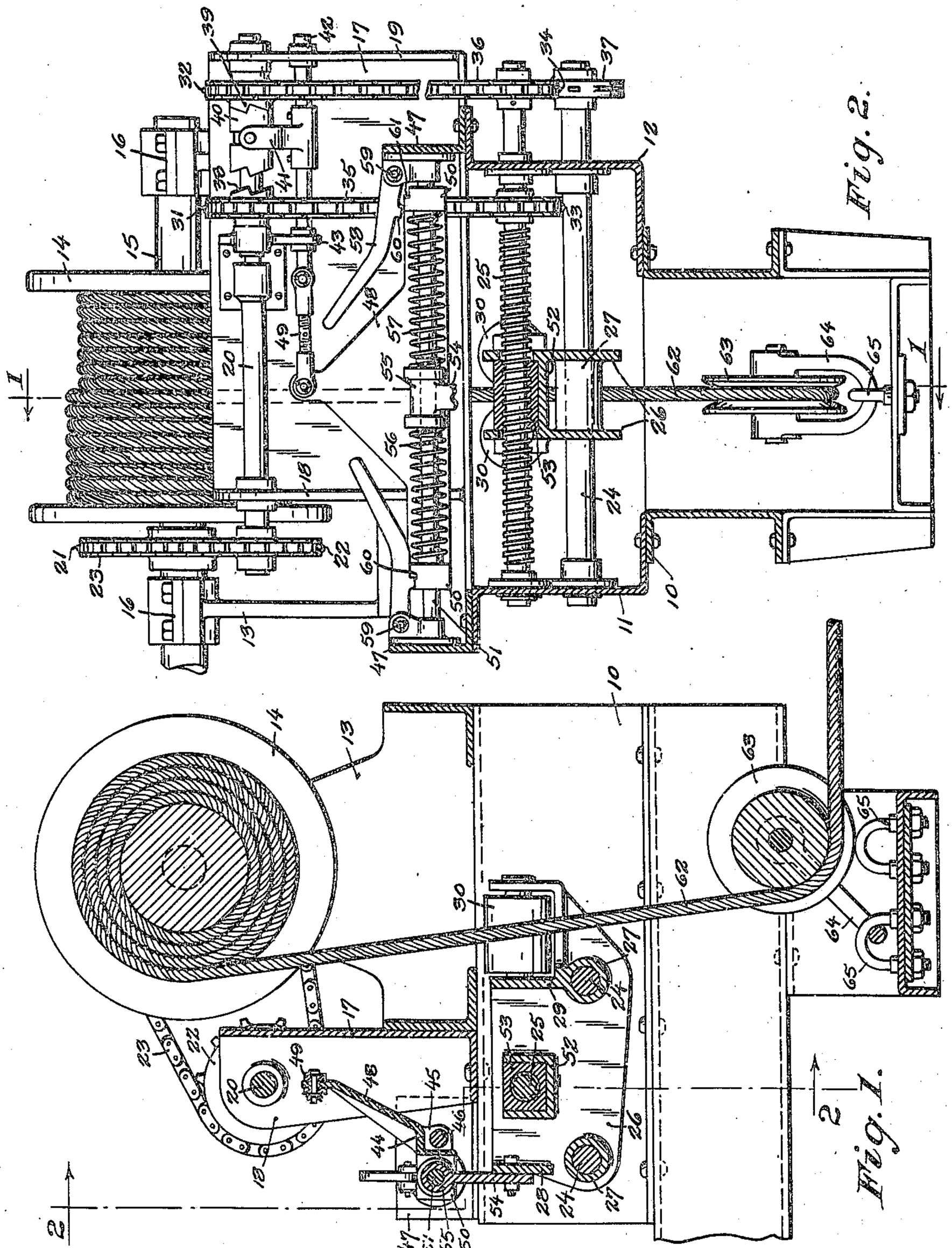

Fig. 2.

Fig. 1.

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LEVEL WINDING DRUM

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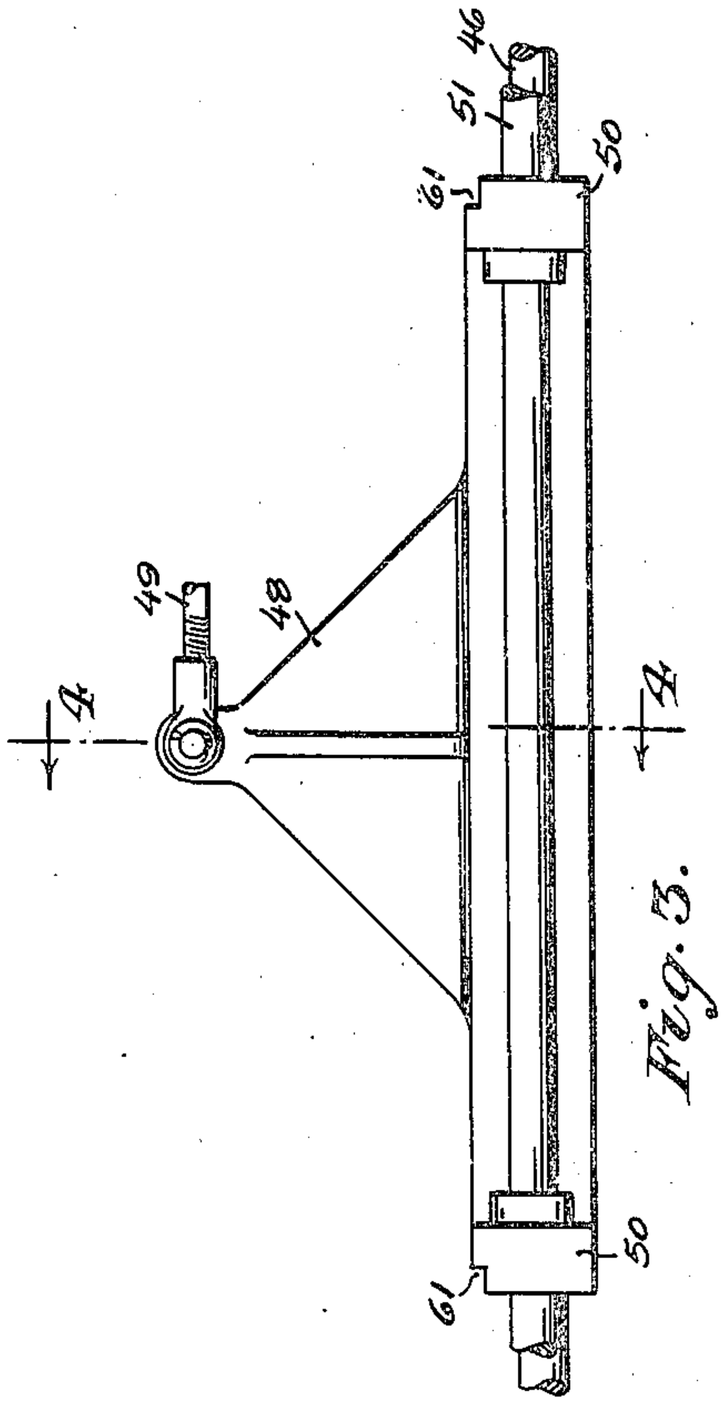

Fig. 3.

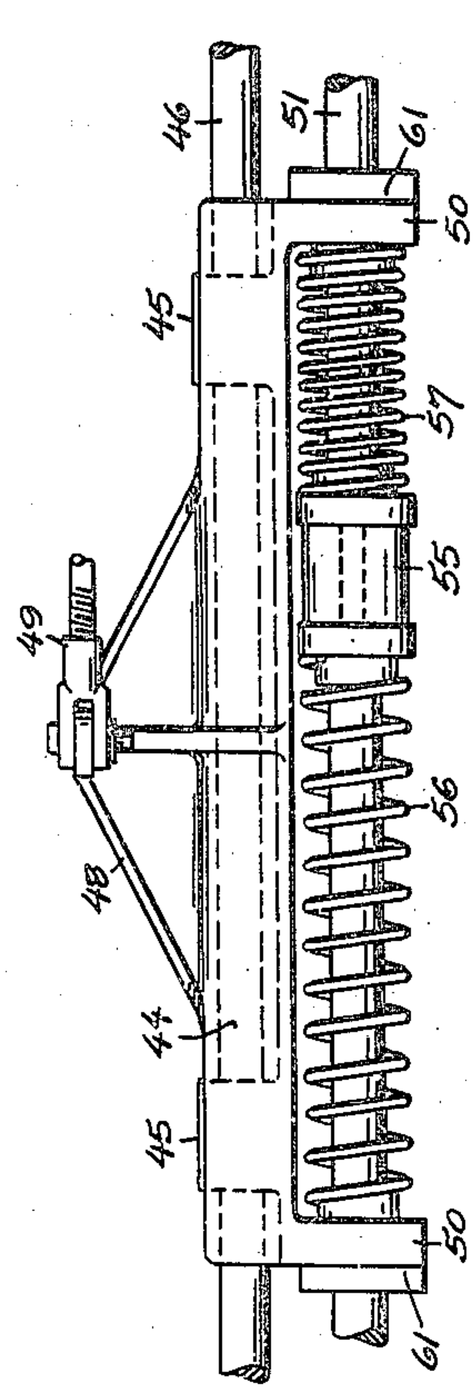

Fig. 5.

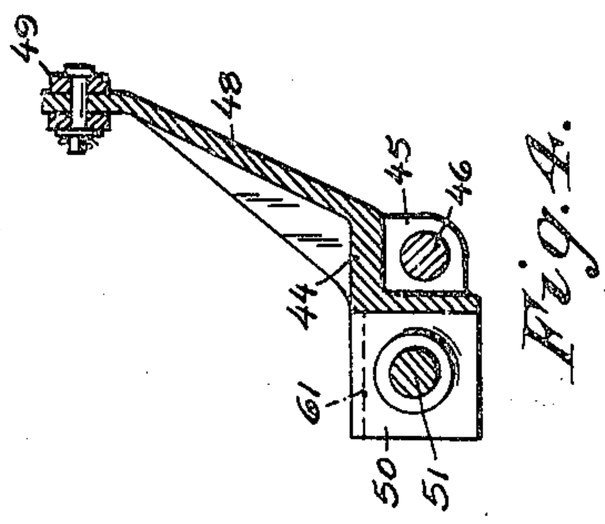

Fig. 4.

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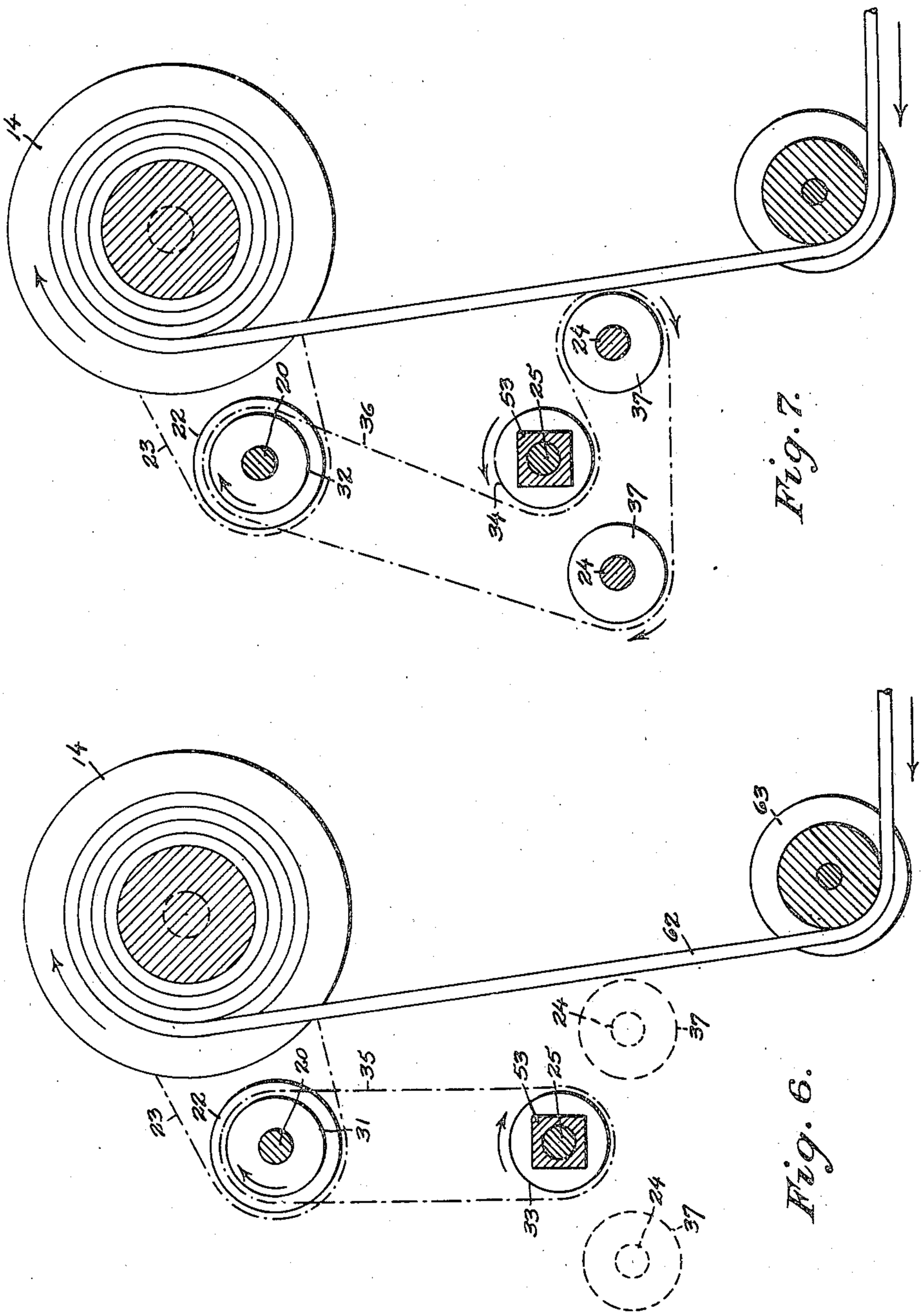

Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE

2,483,688

LEVEL WINDING DRUM

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Application July 24, 1945, Serial No. 606,738

5 Claims. (Cl. 242—158)

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This invention relates to certain new and useful improvements in a level winding reel or drum.

In the layering of a cable strand on a winding reel or drum, it has heretofore been customary in accomplishing the level winding of the cable to move the cable between a pair of guide rollers on a reciprocating carriage that was activated by a screw feed device embodying crossed spiral threads with a finger on the carriage tracking in such grooves, the latter being so arranged as to effect reciprocatory movements of the carriage when said carriage reaches its limit of movement in opposite directions as determined by the carriage finger reaching the end of the groove in the feed screw.

In apparatus of the foregoing character, it has been found that when the basic principal of the finger and spiral groove feed is embodied in relatively light constructions, such as fishing line reels, highly efficient results are obtainable in the operation thereof, but when such devices are employed in heavier apparatus, as in cable winding drums, resistant drag on the finger working in the feed screw produces excessive wear on the finger.

It is therefore the primary object of the present invention to overcome the foregoing difficulties in the operation of a level winding drum or reel, and in lieu of the finger and grooved rod feed for the carriage which carries the guide rollers there is provided a structure of the jack-screw feed type with a clutch mechanism rendered operable by reciprocatory movements of the carriage for effecting reverse rotational directions of the feed screw.

A further object of the invention is to provide a level winding reel or drum of the foregoing character and one that is well adapted for mounting on a truck and embodying a jack-screw type of feed for effecting reciprocatory movements of the carriage, and further providing spring devices and coacting trigger or latch arms associated therewith and with the clutch mechanism for driving the feed screw, with the loading of the spring devices occasioned by reverse movements of the carriage being operative upon release of a trigger arm for shifting the clutch and reversing the direction of rotation of the feed screw.

With the above and other objects in view and which will become apparent as the nature of the invention is better understood, the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawings, and claimed.

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In the accompanying drawings:

Figure 1 is a vertical cross-sectional view taken on line 1—1 of Figure 2, showing the level-winding structure constructed in accordance with the present invention, the same being mounted upon an automotive truck that is fragmentarily illustrated,

Figure 2 is a vertical longitudinal sectional view taken on line 2—2 of Figure 1, with the drum shaft broken away at one end,

Figure 3 is an enlarged fragmentary front elevational view of the trip-actuated clutch control with the spring devices and spring loading arm omitted,

Figure 4 is a vertical cross-sectional view taken on line 4—4 of Figure 3,

Figure 5 is a fragmentary top plan view of the clutch control with parts omitted, the better to illustrate the kick-springs and the spring-loading arms and illustrating one of the springs under compression or loaded,

Figure 6 is an enlarged sectional view illustrating the rotation of the jack screw in a clockwise direction, and

Figure 7 is a view similar to Figure 6 showing the drive chain passing over idlers for effecting counter-clockwise direction of rotation of the jack screw.

Referring more in detail to the accompanying drawings and particularly to Figures 1 and 2, the level winding drum is illustrated as mounted upon an automotive truck, a part of which is indicated by the reference character 10. The frame structure carrying the cable drum includes a sub-frame having spaced side walls 11 and 12 secured to the truck and an upper frame structure comprising spaced side walls 13 between which the cable drum 14 is rotatably mounted by means of a shaft 15 journaled in bearings 16.

A mechanism supporting wall 17 rises from the sub-frame and extends in a direction longitudinal to the drum shaft 15, being offset laterally with respect thereto as shown in Figure 1, and has at each vertical edge end thereof a right angularly directed relatively short vertical wall 18 and 19, respectively.

The drum shaft 15 is powered from a suitable source and rotary motion thereof is communicated to a shaft 20, hereinafter referred to as the clutch shaft, which is journaled in the walls 18 and 19. Aligned sprocket wheels 21 and 22 respectively carried by the drum shaft 15 and clutch shaft 20 are traversed by a sprocket chain 23.

A pair of horizontally aligned shafts 24 is

journaled in the side walls 11 and 12 of the sub-frame, and the jack screw 25 is likewise journaled in said walls in a plane above the shafts 24 as illustrated in Figures 1 and 2.

Freely mounted on the shafts 24 is a reciprocating carriage comprising a pair of spaced side walls 26 with shaft bearings 27 interposed therebetween and said walls 26 are connected together adjacent the upper ends by a pair of cross walls 28 and 29. A pair of cable-guiding rollers 30 is journaled on the carriage below the cable drum 14.

The operating mechanism for the jack screw 25 comprises a pair of sprocket wheels 31 and 32 loosely journaled on the clutch shaft 20 and respectively aligned with sprocket wheels 33 and 34 on the jack screw 25. As illustrated in Figures 2 and 6, a sprocket chain 35 traverses the sprocket wheels 31 and 33, while the sprocket chain 36 that traverses the sprocket wheels 32 and 34 also passes over idler sprockets 37 on the shafts 24 as shown in Figure 7 to effect reverse rotation of the jack screw 25.

The opposed spaced sides of the sprocket wheels 31 and 32 are provided with clutch teeth 38 and 39, respectively, and the clutch member 40 that is splined on the clutch shaft 20 between said sprocket wheels 31 and 32 is selectively engageable with these clutch teeth 38 and 39, with movement of the clutch member 40 in splined relation to the shaft 20 being effected by the forked operator 41 carried by a shaft 42 slidable at one end in the wall 19 of the frame and slidably supported adjacent its other end by a bearing 43 mounted on the wall 17 of the frame, the other end of the shaft 42 being in communication with a clutch control device.

As shown more clearly in Figures 1 to 5, the clutch control device comprises a plate structure having a horizontal arm portion 44 provided with end lugs 45 that are slidable upon a rod 46 secured at its ends in upstanding relatively short walls 47 rising from the side walls 11 and 12. A triangular plate 48 rises from the arm portion 44 with the upper end thereof having an adjustable turnbuckle connection 49 with the adjacent end of the shaft 42 that carries the forked operator for the clutch. A second pair of end lugs 50 is carried by the horizontal arm portion 44 of the clutch control, while the shaft 51 mounted at its ends in said walls 47 extends through said lugs 50.

The connection between the jack screw 25 and the clutch control device includes a box-like frame 52 extending between the side walls 26 of the carriage and within which box-like structure the nut 53 is non-rotatably mounted, said nut having threaded engagement with the jack screw 25. An upstanding arm 54 is secured to the cross wall 28 of the carriage and has a sliding bearing head mounting 55 at its upper end upon the shaft 51, a pair of compression coil springs 56 and 57 being respectively mounted on the shaft 51 at opposite sides of the bearing head 55 and engaging at their outer ends with the end lugs 50 on the clutch control device. As illustrated in Figure 2, a latch arm 58 is associated with each lug 50, being pivotally mounted as at 59 on the adjacent wall 47 in overlying relation to the shaft 51. Each latch arm 58 has a finger projection 60 for selective reception in a cross notch 61 on the adjacent lug 50.

In the operation of the level winding drum, it being understood that the drum shaft 15 is powered and rotation of this drum shaft is communicated to the clutch shaft 20, and assuming that the drum 14 is being driven in the direction indicated by the arrow lines in Figures 6 and 7 to wind the cable thereon, the drive for the jack screw 25 with the clutch member 40 in the position illustrated is through the sprocket chain 36, and with the latter traversing the idlers 37 the jack screw 25 is rotated in a counter-clockwise direction. This direction of rotation of the jack screw causes the carriage to move from the position shown in Figure 2 toward the left and during this movement the bearing head 55 carried by the carriage moves over the rod 51 to compress or load the spring 56, the clutch control being restrained from movement toward the left by means of the latch arm 58 having its finger projection engaged in the cross notch of the lug 50. The cable 62 travels over a pulley 63 that is selectively attached by means of the clevis 64 to a shackle 65, two such shackles being illustrated and being selectively employed, depending upon the direction of travel of the cable 62. The guide rollers on the carriage direct the cable 62 onto the drum 14 and the level winding of the cable on the drum as illustrated in Figure 2 is accomplished by reciprocatory movements of the carriage. With the bearing head 55 shifted by the carriage to the left, as viewed in Figure 2, and with the spring 56 properly compressed, the bearing head at this time engages the angular extension of the latch arm 58 to displace the finger projection 60 from the notch 61 on the lug and permit the compressed spring to shift the clutch control comprising the released lug 50, the arm 44, and the plate 48 connected to the shaft 42, this movement shifting the clutch member 40 to disengage the same from the clutch 39 of the sprocket wheel 32 and bring the clutch into engagement with the clutch 38 of the sprocket wheel 31 whereupon the sprocket wheel 21 becomes active for driving the jack screw 25 through the medium of the sprocket chain 35 in a clockwise direction as illustrated in Figure 6. During this movement the finger projection 60 on the latch arm 58 will fall into the notch 61 of the lug 50 at the right hand side of Figure 2. The drive for the jack screw 25 now being clockwise, the carriage moves to the right for the compression and loading of the spring 57, similar operations taking effect when the bearing head 55 engages the latch arm 58 at the right hand side of Figure 2 for the release of the clutch control device.

From the above detailed description of the invention, it is believed that the construction and operation thereof will at once be apparent, and while there is herein shown and described the preferred embodiment of the invention, it is nevertheless to be understood that minor changes may be made therein which do not depart from the spirit and scope of the invention as claimed.

I claim:

1. In a level-winding drum, the combination with a cable-receiving drum: a clutch shaft driven with the drum; a reversely rotating jack-screw mounted with its axis paralleling that of the drum; a clutch splined on the clutch shaft; driving wheels loose on the clutch shaft and coupled selectively to the clutch by oppositely directed end-wise movements of the latter; a pair of dead shafts disposed to occupy positions adjacent and parallel to the jack-screw; a driving connection, including idler wheels which are carried by each of the dead shafts, drive-coupling one of the driving wheels to the jack-screw for

driving the jack-screw in one direction of rotation; a driving connection drive-coupling the other driving wheel to the jack-screw for driving the jack-screw in the other rotary direction; a carriage having means thereon for guiding the cable to the drum and itself guidably supported for reciprocatory sliding movement by the two dead shafts; connection between the jack-screw and the carriage for reciprocating said carriage; and tension devices controlled in their operation by movements of the reciprocating carriage and operable when the carriage has been moved by clutch-driven action of one driving wheel to the carriage's limit of movement in one direction to then shift the clutch and bring the same into engagement with the other driving wheel.

2. In a level-winding drum, the combination with a cable-receiving drum: a clutch shaft driven with the drum; a reversely rotating jack-screw mounted with its axis paralleling that of the drum; a clutch splined on the clutch shaft; driving wheels loose on the clutch shaft and coupled selectively to the clutch by oppositely directed endwise movements of the latter; a pair of dead shafts disposed to occupy positions adjacent and parallel to the jack-screw; a driving connection, including idler wheels which are carried by each of the dead shafts, drive-coupling one of the driving wheels to the jack-screw for driving the jack-screw in one direction of rotation; a driving connection drive-coupling the other driving wheel to the jack-screw for driving the jack-screw in the other rotary direction; a carriage having means thereon for guiding the cable to the drum and itself guidably supported for reciprocatory sliding movement by the two dead shafts, said carriage comprising spaced-apart plates having bearings extending therebetween to accommodate the slide reception of the dead shafts; connection between the jack-screw and the carriage for reciprocating said carriage; and tension devices controlled in their operation by movements of the reciprocating carriage and operable when the carriage has been moved by clutch-driven action of one driving wheel to the carriage's limit of movement in one direction to then shift the clutch and bring the same into engagement with the other driving wheel.

3. Structure according to claim 2 wherein the connection between the jack-screw and the carriage comprises a mating nut held against rotation between the plates of the carriage.

4. Structure according to claim 1 in which the connection between the jack-screw and the carriage comprises a mating nut, and wherein the carriage provides a box-like frame accommodating removable insertion of the nut thereto and holding the nut stationary in relation to the carriage.

5. In a level-winding drum, the combination with a cable-receiving drum: a clutch shaft driven with the drum; a reversely rotating jack-screw mounted with its axis paralleling that of the drum; a clutch member mounted on and driven by the clutch shaft; driving wheels loose on the clutch shaft, the mounting of the driving wheels and the clutch admitting to relative endwise movement and said parts being so formed as to couple the clutch to one said wheel by said relative movement in one endwise direction and to couple the clutch to the other said wheel by said relative movement in the other endwise direction; a pair of dead shafts disposed to occupy positions adjacent and parallel to the jack-screw; a driving connection, including idler wheels which are carried by each of the dead shafts, drive-coupling one of the driving wheels to the jack-screw for driving the jack-screw in one direction of rotation; a driving connection drive-coupling the other driving wheel to the jack-screw for driving the jack-screw in the other rotary direction; a carriage having means thereon for guiding the cable to the drum and itself guidably supported for reciprocatory sliding movement by the two dead shafts; connection between the jack-screw and the carriage for reciprocating said carriages; and tension devices controlled in their operation by movements of the reciprocating carriage and operable when the carriage has been moved by clutch-driven action of one driving wheel to the carriage's limit of movement in one direction to then shift the clutch and bring the same into engagement with the other driving wheel.

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