April 28, 1959 C. O. BRUESTLE 2,884,120

CATERPILLAR CAPSTAN

Filed Dec. 13, 1955 3 Sheets-Sheet 1

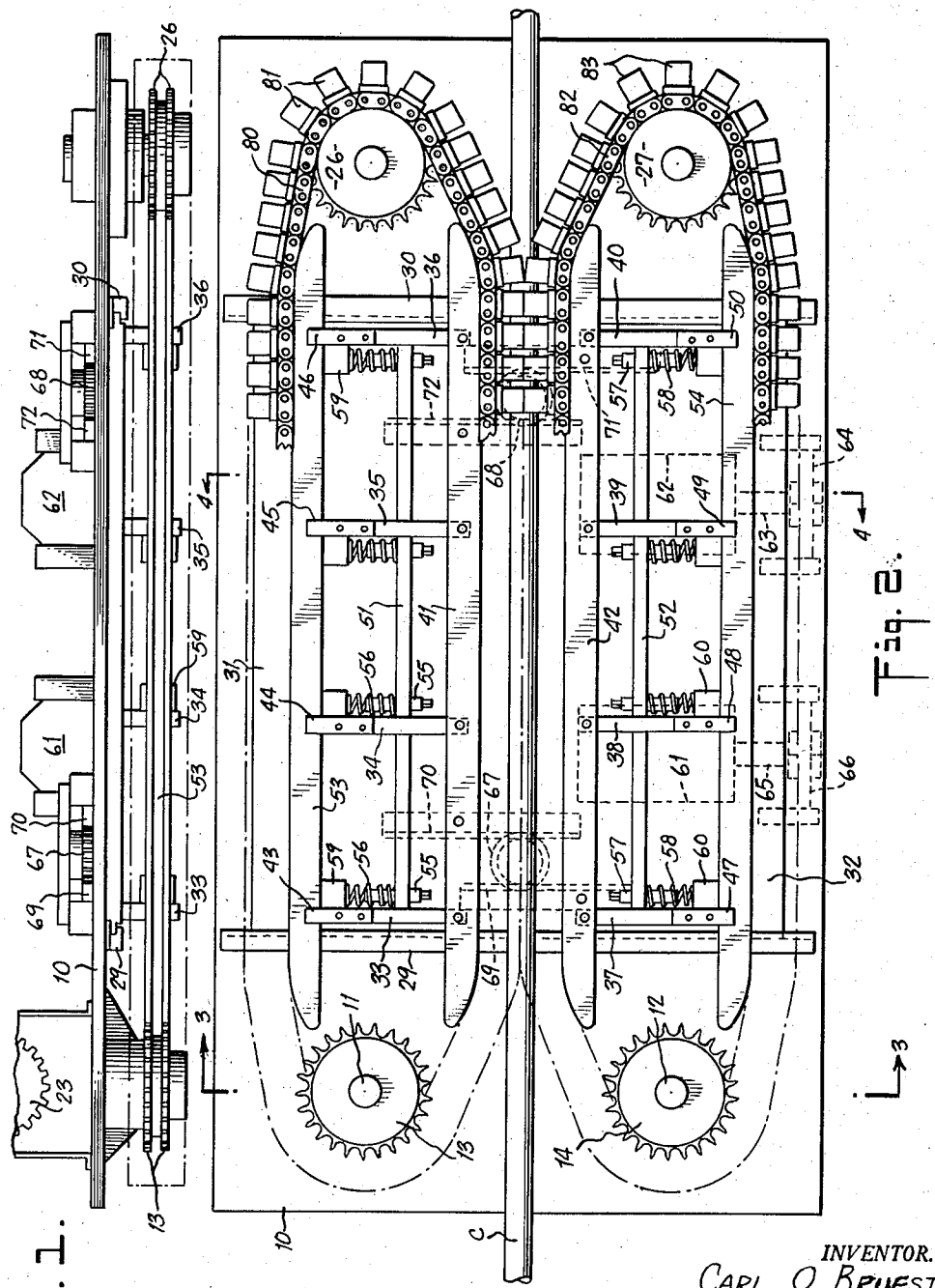

Fig. 1.

Fig. 2.

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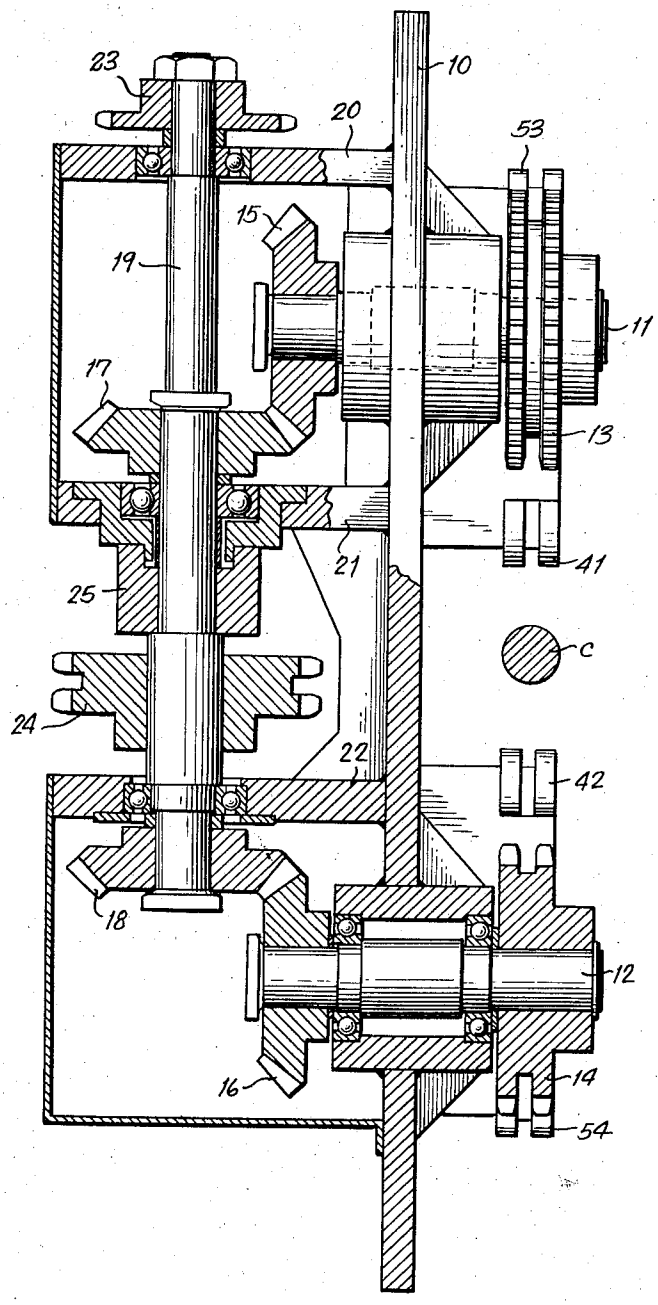

Fig. 3.

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Fig. 5.

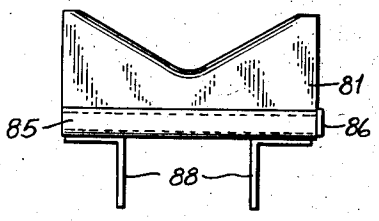


Fig. 6.

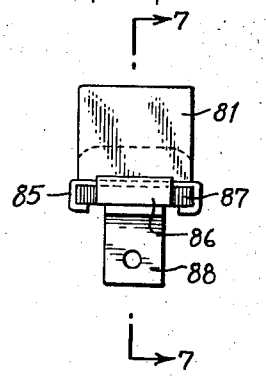


Fig. 7.

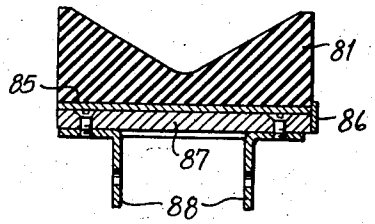
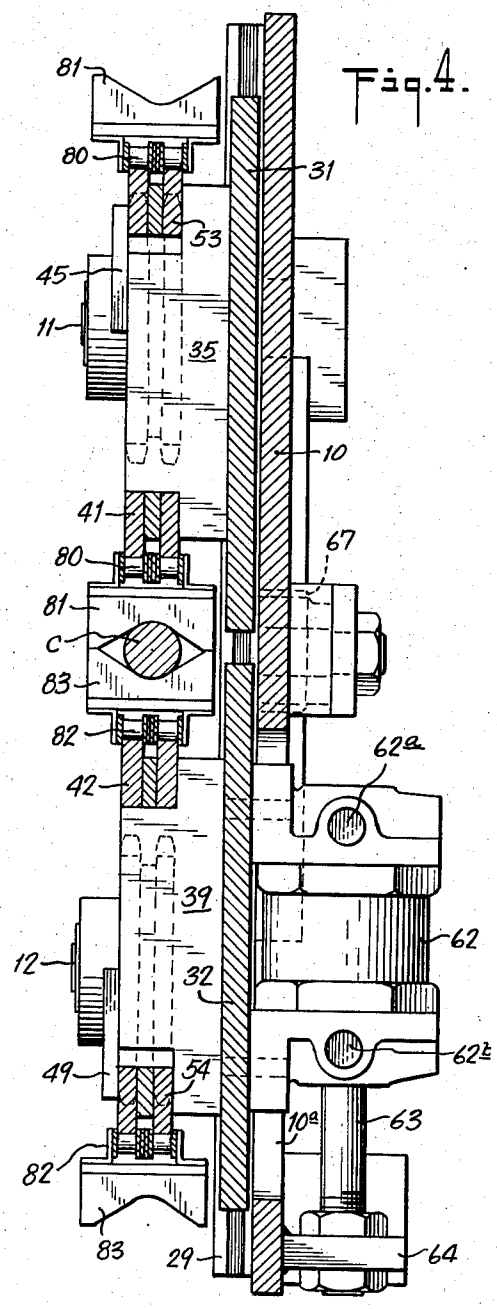


Fig. 4.



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United States Patent Office 2,884,120 Patented Apr. 28, 1959

2,884,120

CATERPILLAR CAPSTAN

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Application December 13, 1955, Serial No. 552,808

2 Claims. (Cl. 203—227)

This invention comprises improvements in the caterpillar type of capstan by means of which heavy wire and cable are pulled lengthwise in various processing operations.

The main object of the invention is to provide an improved form of capstan of this type.

A subsidiary object is to provide a caterpillar capstan construction such as to accommodate various sizes of wire and cable and to automatically adjust itself for any irregularities in the diameter thereof.

Still another object is to provide a caterpillar type of capstan constructed to provide a sure and positive grip on the wire or cable sufficient to impart all the required pulling forces to be met without slippage.

An object of the invention is to provide cable gripping chain supported pressure shoes in pairs to engage the cable to be moved lengthwise thereby at their opposite sides and to provide variable pressure means for said pressure shoes which also acts to guide the supporting chains for said shoes to hold them parallel to the cable center.

Still another object of the invention is to provide resiliently urged compensating rails or cams engaging the chains at points opposite to said pressure rails or cams to keep the chains tight for all sizes of cable within the capacity of the capstan.

Another object of the invention is to provide a supporting structure on the chains for each section of the shoe pairs to facilitate changing the gripping shoes to adapt the machine for different cable sizes and cross sectional shapes.

Another object of the invention is to provide supporting structures on the chains for each section of the pressure shoe pairs to facilitate the interchange of pressure shoes of various cable sizes and cross sectional shapes.

Other and more detailed objects of the invention will be apparent from the following disclosure of the embodiment thereof shown in the attached drawings.

In the drawings,

Figure 1 is a side elevational view of one form of the device of this invention;

Figure 2 is a top plan view thereof;

Figures 3 and 4 are cross-sectional views taken on the lines 3—3 and 4—4 respectively of Figure 2;

Figure 5 is a side elevational view of one of the gripping shoes and the mounting device therefor;

Figure 6 is an end elevational view of this shoe; and

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 6.

In the illustrated embodiment of the invention the device is shown to include a base plate **10** on which at one end in suitable bearing structures, see Figure 3, are rotatably mounted a pair of shafts **11** and **12**. Secured to these shafts respectively on one side of the plate are the sprocket wheels **13** and **14** and on the other side of the plate the bevel gears **15** and **16**. These bevel gears mesh with the bevel gears **17** and **18** respectively which are secured to a shaft **19**. This shaft is journaled in

suitable bearings mounted in brackets **20**, **21** and **22** secured to the base plate **10**. On one end shaft **19** is a sprocket wheel **23** and intermediate its ends is a driving sprocket **24**. At **25** is a one way clutch. Journaled in bearings mounted on plate **10** at its other end are another pair of shafts on which are secured the sprocket wheels **26** and **27**. As is clear from Figure 2, the sprockets **13** and **26** and **12** and **27** are aligned on axes which are parallel and equidistantly spaced from the centerline of the path of movement of the wire or cable C.

Secured to one face of the plate **10**, see Figures 1 and 2, are a pair of rails **29** and **30** which are arranged in parallel spaced relation and provided with guideways, as is clear from Figures 1 and 4. A pair of plates **31** and **32** are provided with rabbets at their ends to form tongues which slidably engage in the guideways of the rails **29** and **30**, so that the plates **31** and **32** may slide towards and away from each other and lie in a single plane. As is seen from Figure 1, this plane is parallel to the plate **10**. Secured to the exposed face of the plate **31** in parallel spaced relation are a series of plates **33**, **34**, **35** and **36**, which are secured to the plate **31** in any suitable manner and between which, extending longitudinally of the plate, are reinforcing webs, as for example the web **51**. A similar set of plates **37**, **38**, **39** and **40** are secured to the plate **32**, and likewise the reinforcing webs **52**. Secured on the adjacent ends of the plates **33**, **34**, **35** and **36** is a rail or pressure cam **41** which lies parallel to and is spaced from a similar rail or cam **42** secured to the plates **37**, **38**, **39** and **40**. The rails **41** and **42** are equidistantly spaced on opposite sides of the path of movement of the cable C.

At this point it will be helpful to note that the plates which support the rails **41** and **42**, as for example the plates **35** and **39**, are T-shaped so that the rails **41** and **42** are secured thereto in the corner formations at one side. Secured to the other end of each of these plates, as illustrated in Figure 2, are rectangular bars **43** to **50** inclusive, which form with the cornered formations at that end, guideways in which are slidably mounted the rails **53** and **54**. These rails are provided with a series of seat forming members or blocks **59** and **60** against which one end of a series of compression springs **56** and **58** seat. Telescoping with these springs are a series of threaded adjustable spring positioning pins **55** and **57**.

Secured on the opposite side of the plate **10** from the structure just described, are a pair of fluid pressure engines having the cylinders **61** and **62** which are secured to the plates **31** and **32** respectively. The plate **10**, as is clear from Figure 4, is cut away to expose the plates **31** and **32** for attachment of the cylinders, as in the case of the opening 10^a for the cylinder **62**. The piston rods **63** and **65** of these engines are connected to brackets **64** and **66** respectively, which are secured to the plate **10**. Each engine, as illustrated in the case of the engine **62**, is provided with threaded ports 62^a and 62^b, by means of which pressure fluid may be supplied to and exhausted from the cylinder to effect the operation to be later described.

Journaled in suitable bearing structures on one side of plate **10**, are a pair of pinions **67** and **68** which mesh respectively with the toothed racks **60** and **70**, and **71** and **72**. The racks **69** and **71** are secured to the plate **32** and the racks **70** and **72** are secured to the plate **31**. They are arranged in parallel relation, as shown in Figure 1, and mesh with the opposite sides of the pinions.

A pair of endless chains **80** and **82** are mounted on the sprocket pairs **13** and **26** and **14** and **27** respectively. These are roller chains of a type readily available in commerce and on each link there is mounted a gripping or pressure shoe.

Each shoe support consists of a rectangular plate **87**

fastened to a pair of L-shaped brackets 88 forming part of or attached to the links of the chain. The gripping shoes 81, made of any suitable resilient material and having the proper end face formation, are bonded to channel shaped plates 85 which are dimensioned so that they can be slipped endwise into plates 87. Secured at one end to each of the plates 87 is a stop 86, so that when the shoe is slipped in place it will be properly aligned transversely of the chain link. The two chains have the same number of links, and hence are each provided with the same number of shoe structures so that they can together in pairs form a series of wire or cable grips or pressure shoes, as clearly illustrated in Figure 4. The resultant shoes being detachably secured to the chains, can be replaced by other suitably shaped shoes for other sizes and shapes of cables.

In the operation of the device power is applied to the sprocket 24 from any suitable power source through a chain to cause rotation of the shaft 19. The one-way direction provided by the clutch 25 prevents reverse motion or movement of the cable during stoppage of the machine. In passing it is noted that the sprocket 23 had nothing to do with the invention herein claimed.

The bevel gears 17 and 18 drive the sprockets 13 and 14 in an obvious manner to effect conjoint movement of the chains 80 and 82. In order to thread the capstan, pressure fluid is applied through the ports of the engines, as represented by the port 62^b, and exhausted through the ports 62^a, so that the plate 32, Figures 2 and 4, moves downwardly carrying the toothed racks 69 and 71 with it. This movement of the racks causes the pinions 67 and 68 to revolve and their rotation acting through the racks 70 and 72 causes the plate 31 to move upwardly (Fig. 1). As a result the adjacent pair of rails 41 and 42, which are secured to the plates 31 and 32 as previously described, move apart taking the pressure off of the adjacent lengths of the chains 80 and 82. The outermost rails 53 and 54 lying against the outer lengths of the chains are normally restrained by the chains, but take up slack created by separation of plates 41 and 42. This is caused by the springs 56 and 58 which cause a compensating outward movement of the rails 53 and 54 as the pressure on the chains is relaxed. Thus the initial end of a cable to be processed can be fed between the shoe pairs 81—83. When the pressure fluid supply and exhaust connections for the cylinders of the engines 61 and 62 are reversed, the parts return to their original position and pressure is applied to the cable through the rails 41 and 42 and resilient shoes. Floating plates 53 and 54 again preventing slack in the chains. The gripping force of the chains on the cable can be increased if desired by increasing the supply of pressure fluid to the ports corresponding to the port 62^a for the cylinder 62, causing the plates 31 and 32 to tend to move towards each other and increase the pressure on the adjacent lengths of the chains through the rails 41 and 42 secured to these plates. Thus, any required gripping pressure on the cable can be provided through the control of pressure fluid supplied to the engines.

From the above description it will be apparent to those skilled in the art that the subject matter of this invention can be embodied in other detailed forms, and it is to be understood, therefore, that the scope of protection is to be afforded by the appended claims rather than by the single embodiment herein disclosed.

What is claimed is:

1. A cable capstan comprising a pair of relatively movable supports, means for causing conjoint movement of said supports towards and away from each other, a pair of pressure rails attached to said supports in parallel spaced relation and lying on opposite sides of a cable path, a pair of endless chains, means for moving said chains lengthwise along said rails, a plurality of shoes secured to said chains to form gripping pairs cooperating as said chains move along said rails, a bedplate on which said supports are slidably mounted, and said first means comprising a power device connected to one of said supports and driving connections from that support to the other to effect said conjoint movement comprising pinions rotatably mounted on said bedplate and toothed racks connected to said supports respectively and engaging said pinions.

2. A cable capstan comprising a pair of relatively movable supports, pressure fluid means for causing conjoint movement of said supports towards and away from each other, a pair of pressure rails attached to said supports in parallel spaced relation and lying on opposite sides of a cable path, a pair of endless chains, means for moving said chains lengthwise along said rails, a plurality of shoes secured to said chains to form gripping pairs cooperating as said chains move along said rails, said pressure fluid means providing the correct force applied to said gripping pairs, a second pair of rails slidably mounted on each of said supports, and means for resiliently urging said second pair of rails against said chains respectively, said rail pairs being arranged to engage oppositely positioned lengths of the respective chains.

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