United States Patent

Cappotto et al.

[15] **3,642,109**

[45] **Feb. 15, 1972**

[54] BELT TENSION DEVICE

[72] Inventors: **Samuel D. Cappotto**, Syracuse; **Herrick R. Diamond**, Homer; **Aaron C. Zeamer**, Groton, all of N.Y.

[73] Assignee: **SCM Corporation**

[22] Filed: **Jan. 19, 1970**

[21] Appl. No.: **3,710**

[52] **U.S. Cl.** **197/17**, 74/242.11

[51] **Int. Cl.** **B41j 23/08**, F16h 7/12

[58] **Field of Search** 197/17; 74/242.11

[56] **References Cited**

UNITED STATES PATENTS

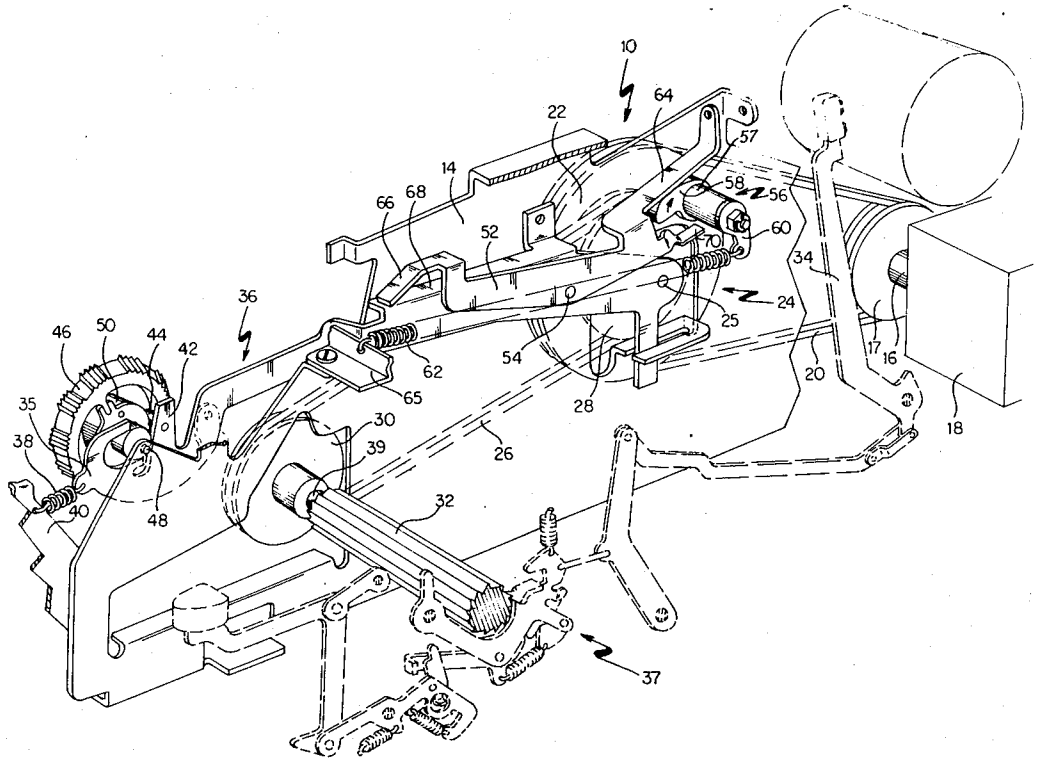
2,573,197	10/1951	Hart	197/17
2,921,660	1/1960	Barkdoll	197/17
3,164,237	1/1965	Cappotto	197/17

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Stephen C. Pellegrino
Attorney—Milton M. Wolson, Carlos Nieves and Harvey Zeller

[57] **ABSTRACT**

A device which increases the tension of transmission belts in response to a decrease in belt tension caused by belt wear, elongation, etc. The belts are carried on a movable pulley and a pivotal cam moves the pulley to increase the tension in the belt.

5 Claims, 4 Drawing Figures



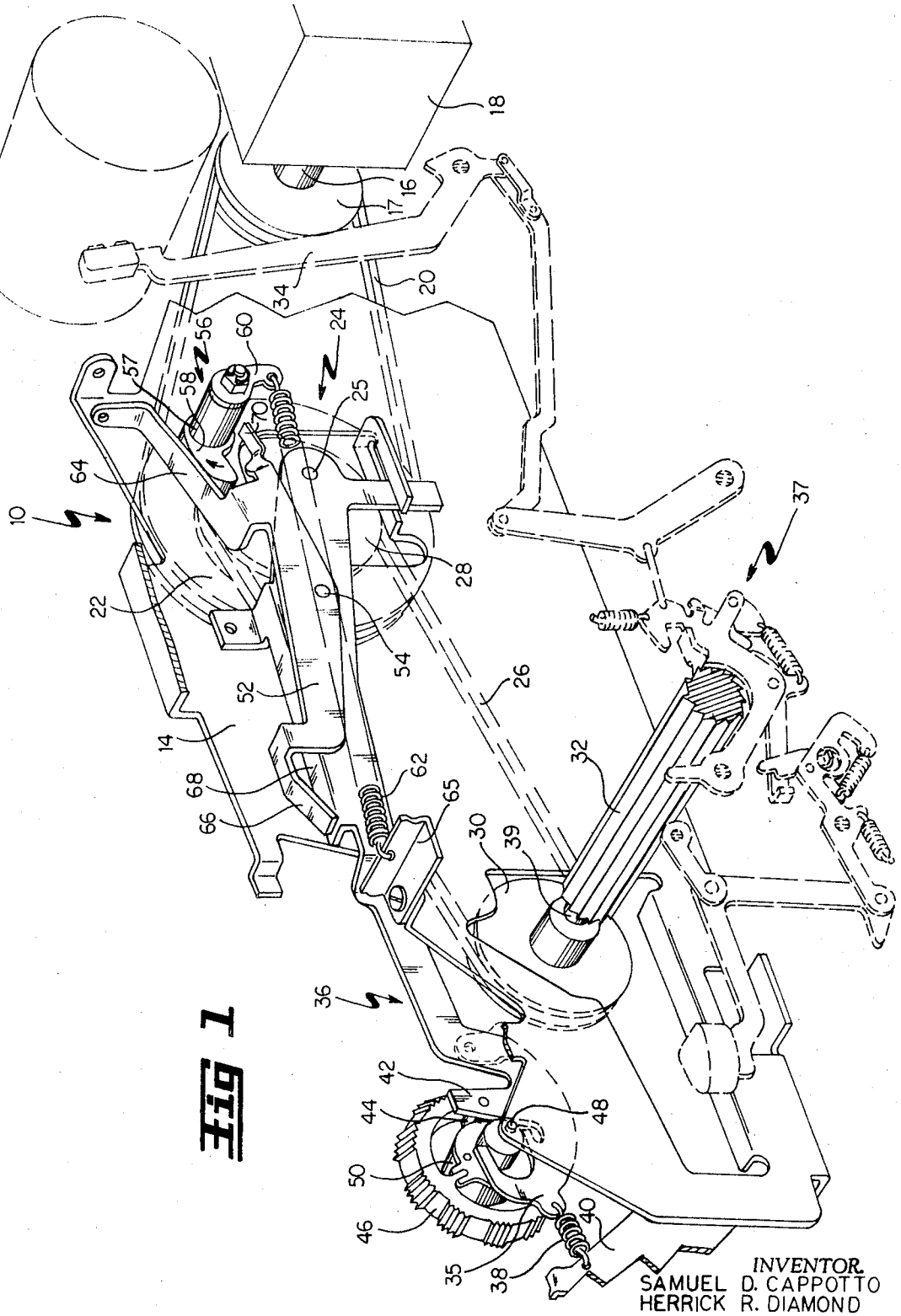


Fig 1

INVENTOR.
SAMUEL D. CAPPOTTO
HERRICK R. DIAMOND
AARON C. ZEAMER
BY Milton M. Wilson
ATTORNEY

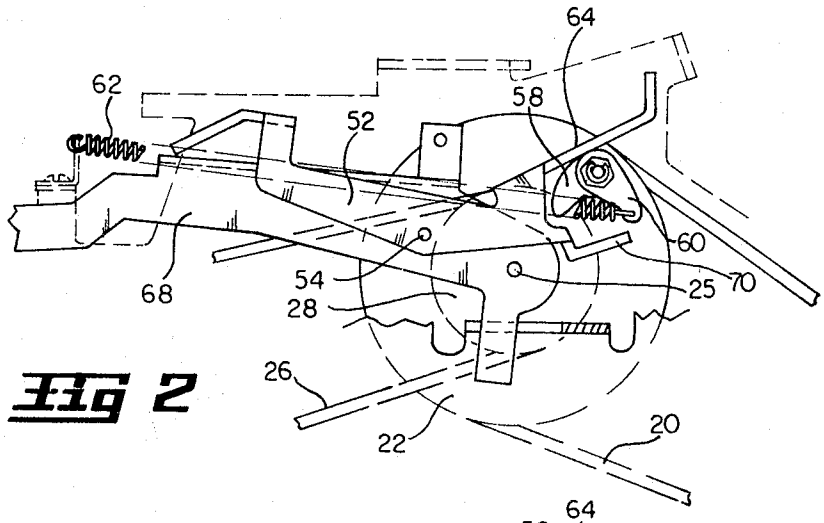


Fig 2

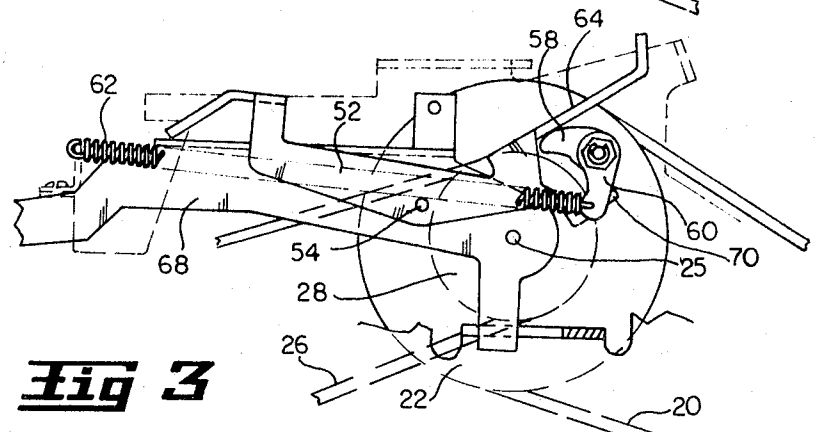


Fig 3

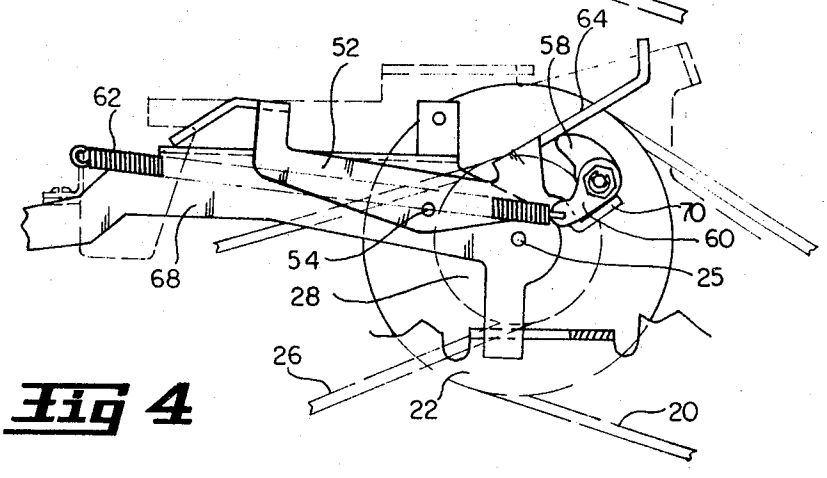


Fig 4

INVENTOR.
SAMUEL D. CAPPOTTO
HERRICK R. DIAMOND
AARON C. ZEAMER
BY Milton M. Wilson
ATTORNEY

BELT TENSION DEVICE

This invention relates to power drive systems and specifically such systems wherein the power is transmitted by a belt and pulley arrangement.

In a typical arrangement a first pulley is secured to a rotative power source, for rotation therewith. An endless belt in the form of a loop connects the first pulley with a second pulley secured to an output shaft so that power is transmitted from the power source to the output shaft.

An electric typewriter is an example of a device in which a variation of this power drive system is utilized. (Although in the following discussion a typewriter will be used for illustration purposes; it is within the scope of the present invention to use the disclosed invention in various other machines and apparatus).

In an electric typewriter, a motor is utilized to rotate a power roll for driving a typebar against an inked ribbon, which causes an impression to be formed on a paper positioned to the rear of the ribbon. The power is transmitted from the motor to the power roll by a first endless belt in the form of a loop which is positioned around a pulley secured to the motor and also around an idler pulley so that the motor acting through the first endless belt rotates the idler pulley. The purpose of the idler pulley will be discussed in a following paragraph. A second endless belt in the form of a loop is positioned around an inner diameter of the idler pulley and also around another pulley secured to the power roll so that the power roll is rotated by the idler pulley which in turn is rotated by the motor.

It is well known that in typewriters such as described above a decrease in belt tension is a common cause of irregular, nonuniform type impression. A decrease in belt tension may occur from various reasons, such as belt wear and belt elongation due to stretching.

A prior art approach to solving the problem of decreased belt tension has been to position the transmission belts around a spring-biased intermittent moveable idler pulley. The force of the spring moves the idler pulley and the attached belts in a direction to increase the tension in the belts, in response to a decrease in the belt tension.

In an approach such as this, the spring must exert a constant force on the idler pulley to maintain a uniform type impression. However, in this prior art approach as the spring exerts a force on the idler pulley; the pulley is moved toward the spring and thereby the length of the spring is reduced. Since the length of the spring is reduced, the force it exerts on the idler pulley is lessened, and thus the force available to increase the belt tension is lessened, causing the resulting type impression to be nonuniform and unsatisfactory.

It is therefore an object of the present invention to provide a novel belt-tensioning device for use in apparatus having power drive systems which utilizes a spring and cam arrangement to exert a substantially constant force on a belt-carrying pulley.

Another object of the present invention is to provide a belt-tensioning device, for use in typewriters and similar machines wherein a uniform type impression is desired.

Another object of the present invention is to provide a novel belt-tensioning device wherein a spring-biased cam moves an idler pulley to increase the tension in the belts carried on the idler pulley in response to a decrease in belt tension caused by belt wear, elongation, etc., so that the belts are maintained at a constant uniform tension.

These and other objects of this invention will become more fully apparent by reference to the appended claims and as the following detailed description proceeds in reference to the accompanying drawing wherein:

FIG. 1 is a front perspective view of an electric typewriter including the belt-tensioning device of the present invention;

FIG. 2 is a partial side elevation showing the belt-tensioning device wherein the cam is shown in its initial position.

FIG. 3 is a partial side elevation showing the belt-tensioning device wherein the cam is shown in an intermediate position.

FIG. 4 is a partial side elevation showing the belt-tensioning device wherein the cam is shown in its final position.

Referring now to the drawings in detail and particularly to FIG. 1, wherein is illustrated a typewriter **10** including a belt-tensioning device **12**.

The typewriter **10** comprises a motor **18** mounted on a backframe (not illustrated). A pulley **17** is mounted on an output shaft **16**, of motor **18** for rotation therewith. An endless belt **20** in the form of a loop is wrapped around pulley **17** and a large diameter portion **22** of variable pitch idler pulley **24**. Idler pulley **24** is mounted on a pulley shaft **25** for vertical and rearward movement in side frame **10**. Thus it is seen that power from motor **18** acting through pulley **17** and belt **20** causes rotation of idler pulley **24**.

A second endless belt **26** in the form of a loop is wrapped around the inner diameter **28** of idler pulley **24** and around a pulley **30** which carries a power roll **32**. Rotation of the inner diameter **28** of idler pulley **24** is transmitted to power roll **32** by means of transmission belt **26**. Power roll **32** is carried on a shaft **34** which is mounted in a typewriter side frame **14**.

The power roll **32** drives typebar **34** through a known key action system **36** to cause printing. The illustrated key action is described in detail in U.S. Pat. Re. No. 25,011, reissued July 18, 1961 to J. P. Barkdoll. From the description in this patent, it is understood that the speed of power roll **32** affects the impression of the typebar **34** and as is well known in the typewriter art in order to maintain a uniform type impression a constant power roll speed should be maintained.

One means employed in the disclosed device for maintaining the belts **20** and **26** at constant tension, is a conventional impression control member **36**. One end **35** of impression control member **36** is attached by means of a spring **38** to side frame extension **40**. The other end of impression control lever **36** is mounted on pulley shaft **25**. An upward projecting tab **42** mounted on impression control lever **36** carries a cam follower stud **44**. An impression control knob **46**, which is manually operated, is attached to side frame **14** by means of a small stub shaft **48**. The impression control knob **46** has an interior cam hub **50**. As is understood from the drawing, spring **38** urges cam follower stud **44** into engagement with interior cam hub. The configuration of cam hub **50** is such that rotation of impression control knob **46** in a clockwise direction urges cam follower stud **44** and therefore impression control lever **36** rearwardly. Movement of impression control lever **36** rearwardly increases the speed of power roll **32** in a known manner. What has heretofore been described is a conventional impression control mechanism whereby an operator by manually rotating impression control knob **46** may control the type impression by increasing (or decreasing) the speed of the power roll **32**. The impression control lever **36** is not required to be used in conjunction with the belt-tensioning device of the present invention, next described.

A follower member **52** is pivotally mounted on impression control lever **36** about pin **54**. A cam **56**, carried on cam shaft **57** mounted in typewriter side frame **14**, having a cam lobe portion **58** and an arm portion **60** is biased clockwise by a spring **62** against the lower surface of an extension **64** of follower member **52**. The spring **62** is attached to a crossmember **65** secured to side frame **14**. An adjustable tab portion **66** of follower member **52** engages an upper surface **68** of impression control lever **36** so that follower member **52** and impression control lever **36** form a rigid connection in the sense that upward movement of follower member **52** will cause upward movement of impression control lever **36**. By this arrangement of parts it is seen that cam **58** exerts a force on the lower surface of extension **64** which causes follower member **52**, impression control lever **36** and idler pulley to **24** to move upwardly to increase the tension in belts **20** and **26**.

The position of extension **64** of follower member **52** with respect to cam **56** may be varied by changing the position of adjustable tab portion **66** of follower member **52** with respect to the upper surface **68** of impression control lever **36**. For example bending adjustable tab portion rearwardly on upper surface **68** of impression control lever **36** will cause extension **64** of follower member **52** to pivot downwardly on cam **56**

whereby cam **56** will assume a more flattened position. This feature is especially important as it permits the initial position of cam **56** to be readily adjusted so as to take advantage of its full cam range.

From the foregoing description and with particular reference to FIG. **1**, it will be observed that as the tension in belt **20** and/or belt **26** is decreased due to wear, etc., the force which extension **64** of follower **52** exerts on cam **56** will also be lessened. This will permit spring-biased cam **56** to move extension **64** of follower **52** upwardly, which as discussed previously will raise idler pulley **24** to increase the belt tension. In the present device, the increase in belt tension in response to a decrease in belt tension occurs so rapidly that for all practical purposes the belt system may be considered to be maintained at a uniform tension.

FIG. **2** represents the belt-tensioning device in its initial position prior to any decrease in belt tension. It is noted that in this position spring **62** is at its greatest length and will exert its greatest force on cam lobe **58** of cam **56**.

As the tension in **20** or **26** decreases the cam **56** and spring **62** assumes various intermediate positions; one of which is illustrated in FIG. **3**. In this position the length of spring **62** and therefore the force exerted by spring **62** will be less than the length and force of spring **62** when it is in the position illustrated in FIG. **1**.

It is desired however that the force exerted by the spring-biased cam **56** on the extension **64** of follower **52** remain substantially constant for any position of spring **62** and cam **56** to insure a uniform type impression. The cam **56** is therefore designed so that the effective lever arm of the cam **56** acting on extension **64** of follower **52** increases as the force of spring **62** decreases whereby the force of cam **56** on extension **64** of follower **52** remains substantially constant for any position of spring **62** and cam **56**. FIG. **4** illustrates the belt-tensioning device in its final position wherein cam **56** is in its final position. Cam **56** is prevented from further movement by its engagement with stop **70** located at the lower rear portion of follower **52**.

Thus it is seen that in any given cam position, the output force of cam **56** decrease remains substantially constant even though the force exerted by the spring **62** which acts on cam **56** decreases. This results in an improved belt-tensioning device wherein the belt tension is maintained at a constant uniform tension to provide a substantially uniform type impression.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an electric typewriter having a power drive system including a power source, a first belt connecting said power source to a moveable pulley, an impression control lever connected to said pulley by means of a shaft, a second belt connecting said pulley to an output shaft, said pulley being moveable to increase the tension in said first and second belt and a device which moves the pulley in response to a decrease in belt tension, said device comprising:

a. a follower member pivotally supported on said impression control lever in such a manner that movement of the follower member causes the impression control lever and pulley to be moved.

b. a pivotal cam mounted on the typewriter, and

c. means connected to the cam and responsive to a decrease in belt tension of either the first belt or the second belt or both the first and the second belt for pivoting the cam against the surface of the follower member to cause movement of the follower member and pulley.

2. In an apparatus as set forth in claim **1** wherein the means responsive to a decrease in belt tension for pivoting the cam comprises a spring attached at one end to the cam and at the other end to a typewriter frame member.

3. In an apparatus as set forth in claim **2** wherein the effective lever arm of the cam against the surface of the follower member increases as the force of the spring attached to the cam decreases.

4. In an apparatus as set forth in claim **2** wherein the cam comprises a cam lobe portion which engages the surface of the follower member, and an arm portion to which the spring is attached.

5. In an apparatus as set forth in claim **1** wherein means are provided on said follower means to vary the position of said follower means with respect to the cam.

* * * * *