

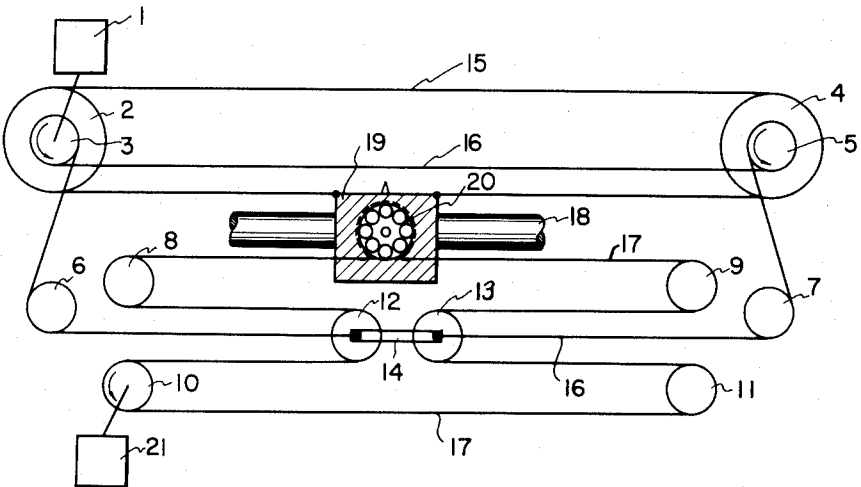
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MULTI-POINT MARKING ASSEMBLY OF A RECORDER

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MULTI-POINT MARKING ASSEMBLY OF A RECORDER

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This invention relates to recording instruments, and more particularly it relates to a new marking or registering mechanism of simple construction and positive marking operation for recorders.

Conventional marking mechanisms known heretofore have had complicated construction, wherein marking is accomplished by rotating a pen support according to the rotation of a guide bar of the pen carriage through the use of gears.

It is an object of the present invention to improve such complicated construction and provide a new marking mechanism of simple construction and accurate and positive marking operation.

The nature, principle, and details of the present invention will be best understood by reference to the following description when taken in conjunction with the accompanying drawing, which is a schematic diagram showing a preferred embodiment of the marking mechanism according to the invention for recorders.

Referring to the drawing, a servomotor 1 which operates proportionally to an indication signal is coupled to a servo system comprising: pulleys 2 and 4 of equal diameter which are coupled by a string 15 stretched therearound and fixed at a part of one span thereof to a pen carriage 19; and pulleys 3 and 5 of equal diameter which are fixed coaxially to the pulleys 2 and 4 and have the same diameter equal to one half the diameter of the pulleys 2 and 4, and which are coupled by a string 16 stretched therearound and around idler pulley 6 and 7 and fixed in the span between the pulleys 6 and 7 to the ends of a connecting member 14 which rotatably supports movable pulleys 12 and 13.

The aforesaid pen carriage 19 travels along a rotatable guide bar 18 and supports a rotatable pen support 20 which in turn supports a plurality of pens. Pen support 20 has a cylindrical surface, and a string 17, stretched around the same, facilitates rotation. The string 17 constitutes the coupling medium of a pulley system which is driven by a synchronous motor 21, and which comprises symmetrically disposed pairs of pulleys, namely, pulleys 10 and 11, the afore-mentioned moving pulleys 12 and 13, and pulleys 8 and 9. Guide bar 18 is made rotatable in order to reduce and render more uniform the friction between it and carriage 19.

The above-mentioned pulleys 2 through 13, inclusive, are so disposed that the span of the string 15 between the pulleys 2 and 4 in which it is fixed to the pen carriage 19, the span of the string 16 between the pulleys 6 and 7 in which it is fixed to the connecting member 14, and the span of the string 17 between the pulleys 8 and 9 in which it is engaged with the pen support 20 in the form of a pulley are substantially parallel to the direction of travel of the pen carriage 19 along the guide bar 18.

Referring to the drawing, the operation of the embodiment of the above constructional arrangement according to the invention will first be described with respect to the state wherein the servomotor 1 is stopped. With the servomotor 1 in the stopped state, the pulleys 2 through 7, inclusive, do not rotate, and the moving pulleys 12 and 13 are also in fixed position. If, under

this condition, the synchronous motor 21 is caused to rotate through a certain value of angle, the pulleys 8 through 13, inclusive, will be rotated by the string 17, and the pen support 20 of the pen carriage 19 will be rotated by the string 17, whereby the required pen will confront the chart.

Next, when the synchronous motor 21 for moving the pen section is stopped and maintained in that state, and the servomotor 1 is operated, the pulleys 2 through 5, inclusive, rotate in the arrow direction. The state after one revolution in the said arrow direction will be considered. This one revolution causes the string 15 to move a certain distance, for example, 5 cm., thereby causing the pen carriage 19 to shift 5 cm. toward the right. The pulleys 2 and 3 and the pulleys 4 and 5 respectively have diameter ratios which are 2:1. Therefore, the string 16 stretched over the pulleys 3 and 5 moves 2.5 cm. Then the pulleys 12 and 13, which are coupled by the connecting member 14 shift 2.5 cm. toward the left. Accordingly, a slack of 2.5 cm. is created in each of the string paths between pulleys 10 and 12 and between pulleys 8 and 12. On the other hand, a deficiency of string of 2.5 cm. is created in each of the paths between pulleys 11 and 13 and between pulleys 9 and 13.

However, since the pen carriage 19 is shifted 5 cm. toward the right, the slacks and deficiencies are corrected, and the pen support 20 does not rotate. That is, there is no rotation of the said pen support 20 due to one revolution of the servomotor 1, and satisfactory operation is obtained. It will be obvious that, since the two operations are independent, simultaneous operation has no adverse effect. Thus, when the said pen support 20 is changed in the above-described manner, marking on the chart is accomplished by the rotation of the guide bar 18.

It is to be observed that, as described above, the present invention provides a marking mechanism of simple construction having a simple, yet reliable operation whereby marking can be readily and positively accomplished.

Although the present invention has been described in conjunction with a particular embodiment thereof, it is to be observed that modifications and variations may be resorted to therein without departing from the scope and spirit of the invention, as those skilled in the art will readily understand, and such modifications and variations are considered as being within the scope and purview of the present invention and appended claims.

What is claimed is:

1. A multi-point marking device for recorders comprising, in combination, a rotatable guide bar; a pen carriage adapted to travel thereon; a plurality of pens; a pen support therefor, rotatably disposed in said carriage and in the form of a pulley; a servomotor; a first string and pulley system comprising a first set of pulleys of equal size, one of them actuated by said servomotor, the string in said system being attached to and facilitating travel of said carriage on said guide bar; a second string and pulley system comprising a second set of pulleys disposed on the same axes as, and being of one-half the diameter of, the first set in said first system, a third set of pulleys connected to each other by a tensioning device, both ends of the string traveling over the pulleys in said second system ending in the respective ends of said tensioning device, and idler pulleys; a third string and pulley system comprising a plurality of sets of pulleys and a string traveling thereover and over said pen support in form of a pulley; a synchronous motor actuating one of said pulleys in said third system thereby causing rotation of said pen support; said synchronous motor operating independently of said servomotor.

2. A multi-point marking device for recorders comprising, in combination, a rotatable guide bar; a pen carriage

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adapted to travel thereon; a plurality of pens; a pen support for said pens in the form of a pulley and rotatably disposed in said carriage; a first set of pulleys of equal size; a second set of pulleys disposed on the axes of said first set and of one-half the diameter of said first set; a servomotor actuating one pulley each of said first and second sets; a first string traveling over and connecting said first set, fastened to said carriage thus facilitating its travel on said guide bar; a third set of pulleys of equal size; a tensioning device connecting said third set; a second string traveling over said second set and ending in both respective ends of said tensioning device; a first set of idler pulleys in the path of said second string between said second and said third set of pulleys; a fourth set of equal size pulleys; a third string traveling thereover and around said pen support in the form of a pulley

thereby adapted to rotate the latter; a second pair of idler pulleys in the path of said third string; and a synchronous motor for rotation of one of said pulleys of said fourth set thus actuating rotation of said pen support; said synchronous motor operating independently of said servomotor.

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