Aug. 11, 1925. 1,549,585

F. S. MARCELLUS

REROLL MECHANISM

Filed June 10, 1924

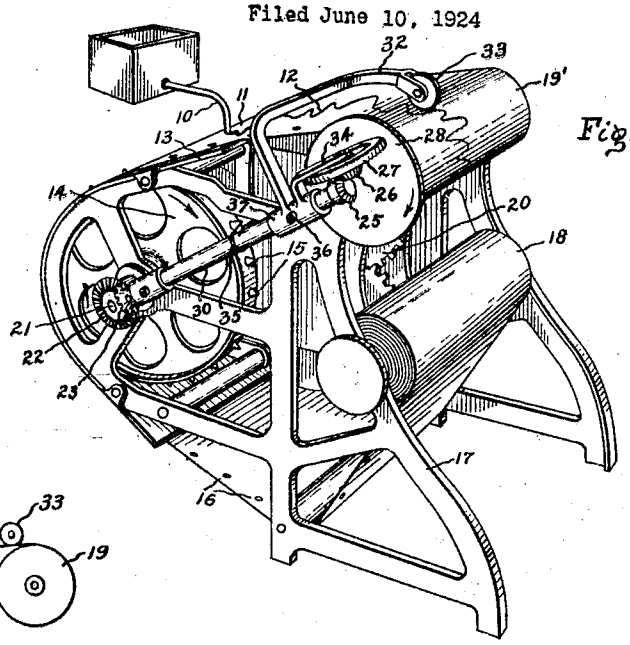


Fig. 1

Fig. 4.

Fig. 2.

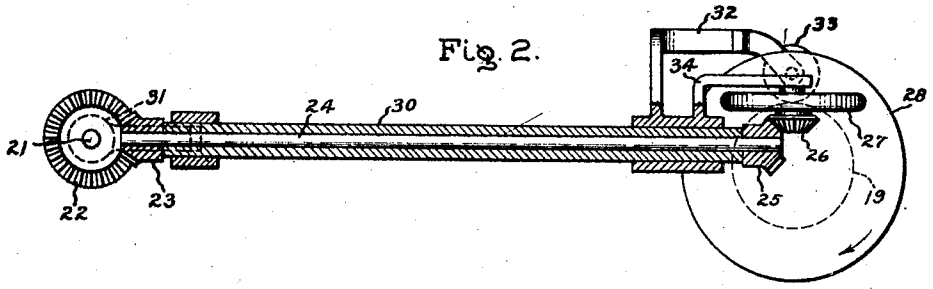
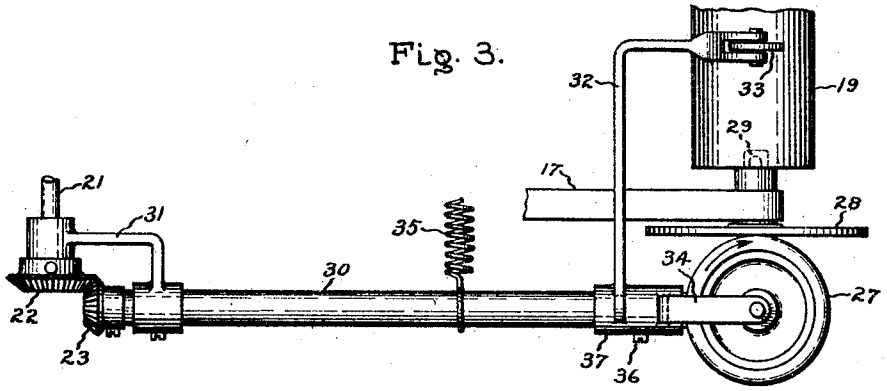


Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDRICK S. MARCELLUS, OF AMSTERDAM, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

REROLL MECHANISM.

Application filed June 10, 1924. Serial No. 719,211.

To all whom it may concern:

Be it known that I, FREDRICK S. MARCELLUS, a citizen of the United States, residing at Amsterdam, in the county of Montgomery, State of New York, have invented certain new and useful Improvements in Reroll Mechanism, of which the following is a specification.

My invention relates to a reroll mechanism suitable for use with curve drawing instruments for rolling up the record sheet as it is delivered from the instrument.

In the usual curve drawing instrument, it is desired that the record sheet shall be advanced at a constant predetermined rate either continuously or intermittently and it is the usual practice to provide an ordinary clock motor suitably geared to the record sheet for performing this function. It is also desirable to provide some means for automatically winding up the record sheet as it is delivered from the advancing mechanism. It has been proposed to use the same motor for both purposes, but heretofore this has introduced a difficulty which is overcome by my invention. This difficulty lies in the fact that while the chart is advanced at a uniform rate, the spool upon which the record sheet is rewound must rotate at a variable rate of speed due to the gradually increasing diameter of the roll as the record sheet is wound upon it. It has heretofore been proposed to provide a driving connection between the motor and reroll spool which included a slip friction device of some kind and to take care of the variation in speed by allowing a variation in the slip of the friction device. This variation in slip causes a wide variation in torque on the clock motor and a consequent variation in speed which introduces inaccuracies in the rate at which the sheet is advanced.

It is the object of my invention to provide a simple reroll mechanism driven from the sheet advancing motor at a speed which takes into consideration the continually increasing diameter of the record sheet roll as it is wound up, while maintaining a substantially constant torque on the driving motor and a uniform tension on the record sheet.

The features of my invention which are believed to be novel and patentable will be pointed out in the claims appended hereto. For a better understanding of my invention, reference is made in the following description to the accompanying drawing wherein I have represented in Fig. 1 a perspective view of one form of my improved reroll mechanism applied to a well known form of recording equipment; Fig. 2 shows a view of the reroll mechanism, partially in section, as observed looking toward the end of the winding up spool; Fig. 3 shows a plan view of the reroll mechanism; and Fig. 4, a diagram illustrative of a torque compensating effect obtainable by my invention.

In Fig. 1, I have represented at 10 the stylus of a curve drawing instrument of any type, for example an electric measuring instrument. This stylus cooperates with the usual record sheet or chart 11 to produce a record 12 of the quantity being measured. The record sheet is advanced over a platen 13 by means of a driving wheel 14 having teeth 15 which mesh with perforations 16 in the edge of the sheet. The platen 13 and driving wheel 14 are supported in a suitable framework 17 as is also the feed roll 18 and the winding up roll 19. The wheel 14 is represented as being driven in the direction of the arrow by the usual clock movement contained within the rear portion of the framework and represented at 20.

My improved reroll mechanism comprises an adjustable speed driving connection between the shaft 21 of the drive wheel 14 and the spool 19 which receives the winding up roll. The details are shown in Figs. 2 and 3. The driving connection comprises in this case a bevel gear 22 mounted on the end of shaft 21 meshing with a bevel gear 23 carried by a shaft 24. The opposite end of shaft 24 carries a bevel gear 25 meshing with a bevel gear 26. Gear 26 drives a short shaft on which is mounted the reroll drive wheel 27 and which in turn bears against and drives a disc wheel 28 directly secured to the reroll spool 19 by the usual clutch designated at 29 in Fig. 3. The shaft 24 is carried in a tubular supporting member 30 which is pivoted on the axis of shaft 21 by means of the bearing arm 31. The opposite end of this tubular member 30 is supported by an arm 32 which extends over the spool 19 and carries a roller 33 which rests upon the record roll 19 contained thereon. It will be seen from Fig. 2 that the drive wheel 27 and the roller 33 bear against disc 28 and roll 19 respectively at the same

radial distance from the axis of roll 19 and it will be evident that this distance increases as the diameter of roll 19 increases. Consequently the roll 19 will be driven by this mechanism at a speed which is inversely proportional to the diameter of roll 19. However, the peripheral sped of the roll will remain constant. The gear ratio between shaft 21 driven by the clock and wheel 27 is such as to make the peripheral speed of drive wheel 27 and therefore of roll 19 the same as that at which the record sheet is advanced by the wheel 14 and by tracing out the direction of rotation of the various wheels it will be seen that the direction of rotation is correct for rolling up the record sheet as it is advanced.

The reroll drive wheel 27 which is carried on an arm 34 extending from the tubular member 30 is preferably provided with a friction tread such as rubber and the contacting surface of disc 28 may be roughened to insure a good friction drive between these parts. A spring 35 is provided to hold wheel 27 against disc 28 and this spring is preferably made quite long, for example the length of the roll 19 so as to have substantially the same tension for any operative position of member 30. Tubular member 30 and the parts carried thereby are biased by gravity so as to keep roller 33 against the roll 19 and the diameter of the roll thus determines the position of the reroll mechanism and the speed ratio thereof. As the roll changes in diameter, tubular member 30 simply swings through a small angle around its pivot point on shaft 21. If the spool 29 is of considerable length, a similar reroll drive may be provided on the opposite end.

The extra load imposed upon the clock motor by this reroll mechanism is small but what is more important is that the load is substantially constant since there is no slip friction clutch in the driving connection and the greater part of the load is made up of the constant friction of the rotating parts. Any slight variation in tension of the record sheet 11 between the roll 19 and platen 13 will not change the load on the motor since any increase in tension on the record sheet between roll 19 and drive wheel 14 simply relieves the drive wheel 14 of just so much load and adds it to the load of the reroll drive. In any event the load on the clock motor is sufficiently constant as not to interfere with its accuracy.

The operation of the arrangement as thus far described will ordinarily be sufficiently accurate. However, a still further accuracy may be had without any additional complications by causing the tension of the record sheet to automatically produce a correcting compensation in the speed ratio between the drive wheel 14 and the spool 19, which compensation maintains the tension constant. This is brought about by making the position of roller 33 such that it rests upon the sheet 11 just before the sheet reaches the surface of roll 19 when it is tight as pictured in Fig. 4, and making the radial position of drive wheel 27 very slightly less than that of roller 33 with respect to spool 19'. This variation in the radial positions of wheel 27 and roller 33 will not be noticeable to the eye and may be correctly adjusted by loosening set screw 36 and turning the bushing 37 very slightly so as to raise roller 33. This adjustment raises roller 33 more than it does the contacting surface of wheel 27 because of the different distances these parts are from the pivot point. When these adjustments are made and the sheet is fairly loose, roller 33 will press the advancing sheet 11 against the roll 19 and the sheet will be rolled up very slightly faster than it is advanced. This will gradually tighten the sheet and at the same time raise roller 33. An exaggerated representation of this condition is shown in Fig. 4. This changes the speed ratio of the reroll very slightly since it throws wheel 27 near the periphery of disc 28 and slows down the speed of spool 29 with respect to the rate of advance of the record sheet which in turn relieves the tension. In this way the tension of the record sheet performs a correcting compensation in the speed ratio of the reroll mechanism which is always in a direction to maintain it correct and the tension constant.

It will be seen that as the diameter of the roll increases, the point at which the sheet becomes tangent to the roll will move about the axis of the roll in a counter-clockwise direction to a slight extent. The point of contact of roller 33 on roll 19 will have a corresponding movement in the same direction and while these movements may not be exactly equal in all cases, they will be sufficiently near enough together to keep the contact point of roller 33 within a desirable compensating range for all ordinary diameters of the roll.

The invention is applicable irrespective of whether the record sheet is advanced continuously or intermittently at a constant or variable rate. I do not wish to be limited to the particular driving connection which I have represented between the sheet advancing wheel and the record receiving roll since it will be obvious that other types of driving connections are available for this purpose.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the ap-

paratus shown and described is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A sheet advancing and rerolling mechanism comprising in combination a motor, means driven by said motor for advancing a sheet, a reroll spool for the sheet, an adjustable speed positive driving connection between said motor and reroll spool, and means responsive both to the diameter of the roll on the reroll spool and the tension of the sheet as it approaches the reroll spool for controlling the speed ratio of said driving connection such as to roll up the sheet at a constant tension.

2. In a reroll mechanism for sheets, comprising in combination with an advancing sheet a shaft which is driven at a speed proportional to the rate of advance of the sheet, a reroll spool for receiving said sheet, a variable speed driving connection between said shaft and spool, an adjustable member for adjusting the speed ratio of said driving connection, a positioning member bearing upon said record sheet adjacent the point where it becomes tangent to the roll on said spool so that the position of said member is responsive to both the diameter of the roll and the tension of the sheet, an arm extending from said positioning member to said adjustable member, said parts being arranged so as to maintain the peripheral speed of the roll received by said spool equal to the rate of advance of the sheet and to maintain constant the tension of the record sheet.

In witness whereof I have hereunto set my hand this 9th day of June, 1924.

FREDRICK S. MARCELLUS.