Feb. 5, 1924. 1,482,802

E. W. LEWIS

FEED MECHANISM FOR MOVING STRIP CHARTS

Filed Sept. 21, 1922 2 Sheets-Sheet 1

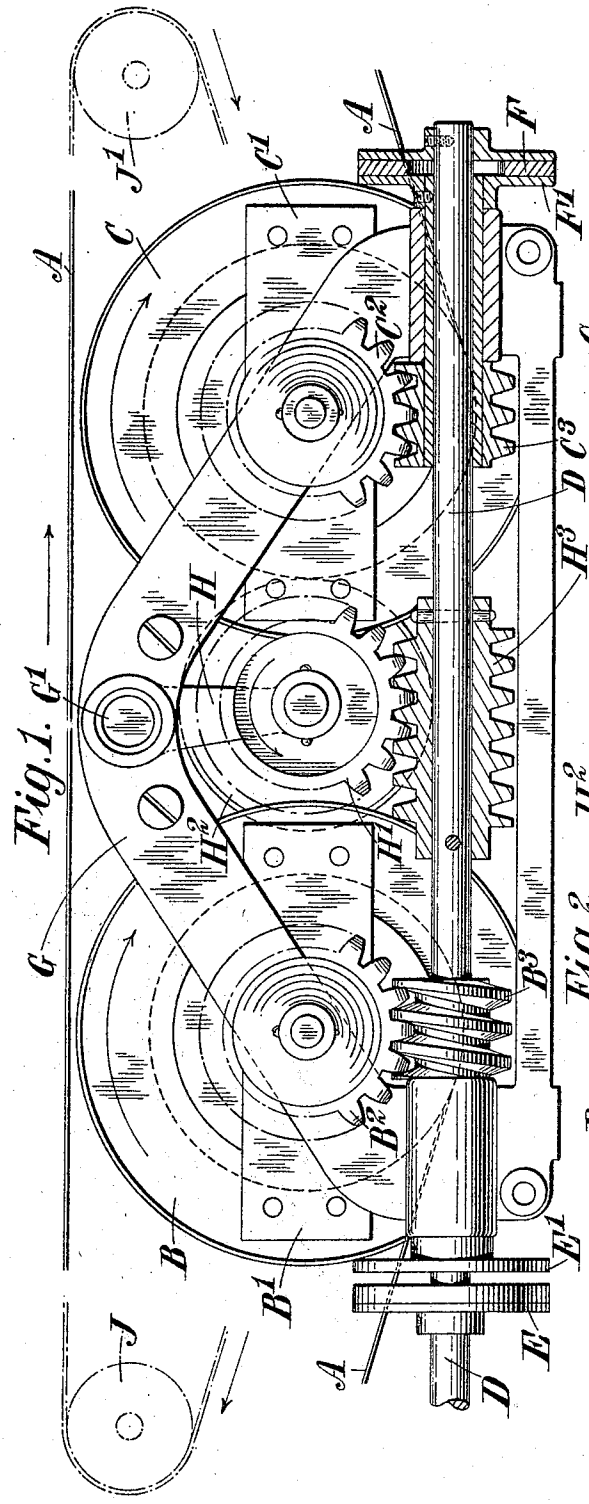

Fig. 1.

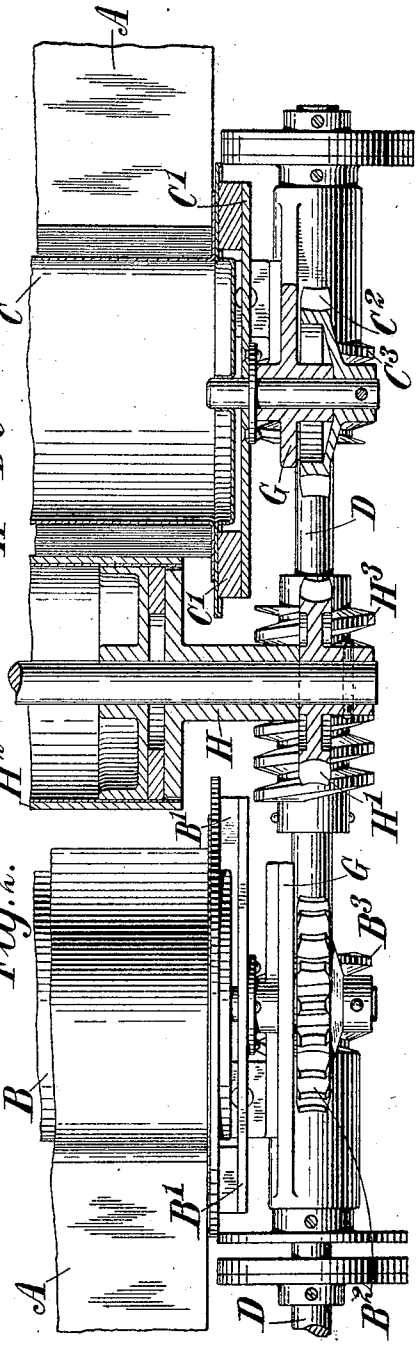

Fig. 2.

INVENTOR.
Edmund Woodward Lewis,
by Byrnes, Keblon & Parmelee,
his attys.

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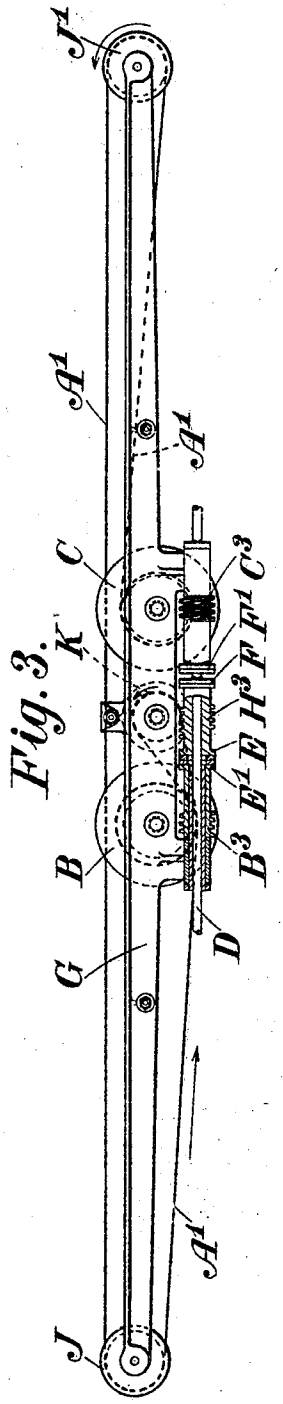

Fig. 3.

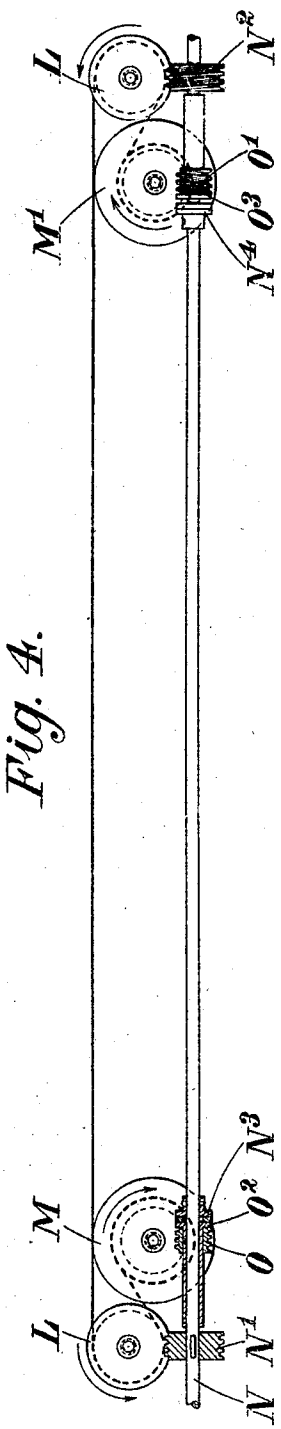

Fig. 4.

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Patented Feb. 5, 1924. 1,482,802

UNITED STATES PATENT OFFICE.

EDMUND WOODWARD LEWIS, OF LONDON, ENGLAND.

FEED MECHANISM FOR MOVING STRIP CHARTS.

Application filed September 21, 1922. Serial No. 589,598.

To all whom it may concern:

Be it known that I, EDMUND WOODWARD LEWIS, a subject of the King of England, residing at London, England, have invented certain new and useful Improvements in Feed Mechanism for Moving Strip Charts, of which the following is a specification.

This invention is for improvements in or relative to feed-mechanism for strip-charts and the like particularly for use in vehicles such as tram-cars, road-vehicles, railway trains and the like and has for its object to provide an inexpensive form of mechanism whereby a strip-chart or the like can be unwound from one spool and wound on to another at a constant linear speed, a portion of the strip extending from one spool to the other being kept taut during such unwinding so that it presents a good reading surface to the observer.

The strip is required to be unwound automatically and in such way as to be governed by the speed of the vehicle so that the exact position occupied by the vehicle on the road charted on the strip is at all times indicated on that part of the strip which is exposed to view. Considerable difficulty has been found in maintaining an even feed of the strip and also keeping the viewing portion taut, as if the driving is effected from the spool the feed, of course, varies as the bulk of the strip on the spool is reduced or increased, and if it is driven by a pair of rollers operating on the central unrolled portion of the strip chart, as has previously been done, these rollers obstruct the view.

In the accompanying drawings:—

Figure 1 is a vertical longitudinal section through the driving-gear of one form of the apparatus according to the present invention;

Figure 2 is a horizontal section through the mechanism, one side of it only being shown,

Figure 3 is a longitudinal section in a vertical plane through the driving-gear of another form of mechanism according to the present invention, and

Figure 4 is a longitudinal section in a vertical plane through the driving-gear of yet another form of mechanism according to the present invention.

Like reference letters indicate like parts throughout the drawings.

In the arrangement shown in Figure 1, the paper strip A is being drawn from the spool B and wound on to the spool C. These spools are free on their spindles and are driven by brake-members B^1 and C^1 respectively which are fast on their carrying spindles. The brake-member B^1 is driven by a worm-wheel B^2 and the brake-member C^1 by a worm-wheel C^2. Both of these worm-wheels are driven by worms B^3 and C^3 respectively. These worms are free on a driving-shaft D which can move endwise and carries fast on it two friction clutch-members E and F respectively. The clutch-member E cooperates with another member E^1 fast with the worm B^3 and the clutch-member F co-operates with a member F^1 fast with the worm C^3. The arrangement is such that when the shaft is at one end of its movement the clutch F, F^1 is in operation and when in its other extreme position the clutch E, E^1 is in operation.

Hung from a frame-member G at G^1 is a yoke H carrying a worm-wheel H^1 which is fast with a roller H^2. The worm-wheel H^1 is driven by a worm H^3 fast on the shaft D.

The paper strip A extends from the spool B over a guide-roller J, supported in a frame not shown, across the top of the apparatus to another guide-roller J^1, thence down to the underside of the spool C round which it passes between the spool and the driving-roller H^2. The upper portion of this strip A is that which is exposed to the viewing-opening and it will be seen that it is free from any elements of the mechanism tending to obstruct a clear view of this upper portion which would have the route and other indications marked upon it.

The operation of this device is as follows:—

When the shaft is driving in the direction indicated by the arrows (Figures 1 and 2), the thrust of the worm H^3 against the worm-wheel H^1 causes the shaft D to move to the limit of its travel to the left, as viewed in Figures 1 and 2, and simultaneously thrusts the wheel H^1 and consequently the driving-roller H^2 to the right against the strip on the spool C. The friction-clutch F, F^1 is thus brought into operation and the clutch E, E^1 is thrown out of operation and the friction of the driving-elements C^1 against the spool C is arranged to be such that its operative grip is always less than that of the operative grip of the roller H^2 upon the strip A on the spool C; also, the speed of the

spool is made to be such that at all times it would tend to wind the strip on it faster than the said strip would be delivered to it by the roller H^2. It thus follows that the spool C is always trying to over-run but is held back by the roller H^2 which becomes the regulating element for the delivery of the strip, and as its peripheral speed will always be the same and is in contact with the strip a regular delivery of the strip will take place regardless of the increase of diameter of the body of the strip as it winds on the spool C. On the other hand, the fact that the spool always tries to over-run will keep the strip taut on the spool.

During the winding of the strip on to the spool C the worm B^3 remains stationary and locks the worm-wheel B^2 so that the friction-element B^1 is thereby held stationary and serves as a resistance against which the strip is drawn off from the spool.

Should the mechanism be reversed, as for example by reversing the motor-vehicle on which the apparatus is fitted, the shaft D will immediately move to the right, as viewed in Figures 1 and 2, so that the clutch F, F^1 will be thrown out of operation and the clutch E, E^1 brought into operation. Similarly, the driving-roller H^2 will be rocked from contact with the strip on the spool C to contact with the strip on the spool B and the spool B will then become the receiving-spool and the spool C will rotate owing to the pull of the strip against the friction of its now stationary friction-member C^1.

In some cases it may be preferred to employ a driving-roller having a fixed support, instead of a rocking one, and such an arrangement is shown in Figure 3. In this construction, the shaft D has the worm H^3 for the driving-roller fast upon it, as before, and all the other parts are arranged the same except that the clutches E, E^1 and F, F^1 are disposed between the worms H^3 and B^3 and H^3 and C^3. The roller K carried on a fixed support takes the place of the roller H^2 on its rocking support, and the paper strip A^1 instead of being carried direct from the guide-roller J to the spool B is carried from the guide-roller J, lapped round the roller K and thence back to the spool B on which it is being received. The operative grip of the friction-drive for the spool B is made to be less than the operative grip between the roller K and the strip A so that this roller controls the rate of feed of the strip as before and the spool B is made to over-run so that no slack shall occur.

With this arrangement the parts remain in the same position for driving in either direction, except that the clutch F, F^1 will be brought into operation when the spool C becomes the receiving-spool, and the clutch E, E^1 when the spool B is the receiving-spool.

If desired, two driving-rollers L (Figure 4) may be employed, in which case they may be placed on those sides of the spools M, M^1 remote from one another and serve both as driving- and guide-rollers. The shaft N would then carry two driving-worms N^1, N^2 to engage worm-wheels on the rollers L and the spools M, M^1 could be driven by worms O, O^1 carried free on the spindle N as before and provided with clutch-members O^2, O^3. The spindle N would carry co-operating clutch-members N^3, N^4 so that the worms O, O^1 could be brought into operation as required by the endwise movement of the shaft N.

It is found that the spacing of the roller K away from the receiving-spool instead of allowing it to run aginst the strip on the spool, as in the case of the roller H^2, permits the strip to align itself between the flanges of the spool so that better guiding is obtained with some forms of strip.

I claim:—

1. In a strip-chart feed-mechanism, the combination of a delivery spool and a take-up spool for a strip, a driving roller arranged to press against the strip on the take-up spool with sufficient grip to control the rate of feed of the strip, means for rotating the driving roller, a friction-drive for rotating the take-up spool in the direction for winding up the strip and arranged to have less grip than the said driving roller has on the strip, but to have a speed such that it at all times tends to overrun the driving roller, and retarding means tending to retard the rotation of the delivery spool, substantially as described.

2. In strip-chart feed-mechanism, the combination of two spools for carrying a strip which is to be unwound from one and wound up on the other, a driving roller mounted to be bodily displaceable so as to press against the strip on either of the spools whichever is operating as the take-up spool with sufficient grip to control the rate of feed of the strip, means for rotating the driving roller, a friction-drive for rotating the take-up spool in the direction for winding up the strip and arranged to have less grip than the said driving roller has on the strip, but to have a speed such that it at all times tends to overrun the driving roller, and retarding means tending to retard the rotation of the delivery spool, substantially as described.

3. In a strip-chart feed-mechanism, the combination of two spools for carrying a strip which is to be unrolled from one and wound on to the other and in so doing present an intermediate viewing portion under tension, a driving-roller so arranged that it will engage the strip with sufficient grip to control its rate of delivery, a shaft for rotating this driving-roller mounted in

bearings permitting of its having endwise movement, a worm fast on this shaft, a worm-wheel for driving the roller engaged with the said worm, two clutch members on the worm-shaft, and two cooperating clutch members situated on opposite sides of the members on the worm-shaft so that they limit the endwise movement of the said shaft by one or the other member butting against the cooperating member, but the spacing being such that only one at a time is in operation, the said cooperating clutch members being connected one with one spool and the other with the other in such manner as to permit of slip at some point between the driving-member and the clutch and the spool, substantially as described.

4. In a strip-chart feed-mechanism, the combination of two spools for carrying a strip which is to be unrolled from one and wound on to the other and in so doing present an intermediate viewing portion under tension, a driving-roller so arranged that it will engage the strip with sufficient grip to control its rate of delivery, a shaft for rotating this driving-roller mounted in bearings permitting of its having endwise movement, a worm fast on this shaft, a worm-wheel for driving the roller engaged with the said worm, two clutch members on the worm-shaft, two cooperating clutch members situated on opposite sides of the members on the worm-shaft so that they limit the endwise movement of the said shaft by one or the other member butting against the cooperating member, but the spacing being such that only one at a time is in operation, and friction-driving means engaging the cooperating clutch members one with one spool and the other with the other spool, substantially as described.

5. In strip-chart mechanism, the combination of two spools for carrying a strip which is to be unwound from one and wound up on the other spool, a driving-roller hung like a pendulum so as to press against the strip on either of the spools whichever is operating as the take-up spool with sufficient grip to control the rate of feed of the strip, means for rotating the driving roller, a friction-drive for rotating the take-up spool in the direction for winding up the strip and arranged to have less grip than the said driving-roller has on the strip, but to have a speed such that it at all times tends to overrun the driving-roller, and retarding means tending to retard the rotation of the delivery spool, substantially as described.

In testimony whereof I affix my signature.

EDMUND WOODWARD LEWIS.