Aug. 7, 1934. R. F. DIRKES ET AL 1,968,818

TAPE CONTROL FOR PROJECTORS

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FIG. 1

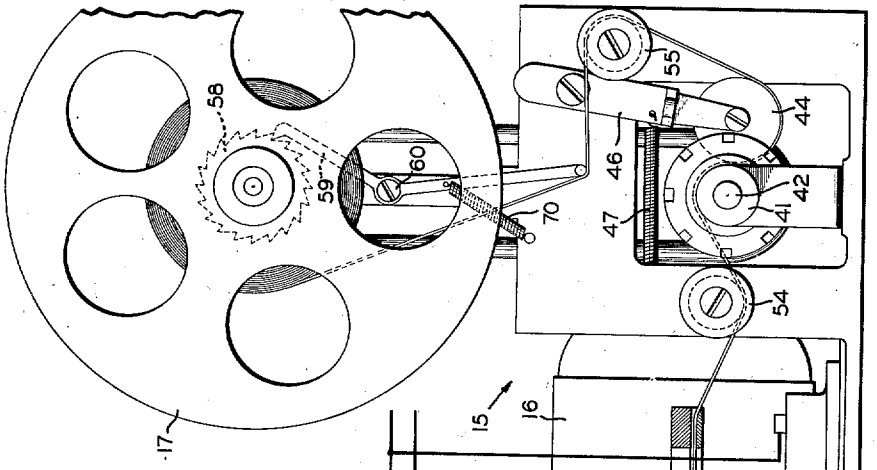


FIG. 6

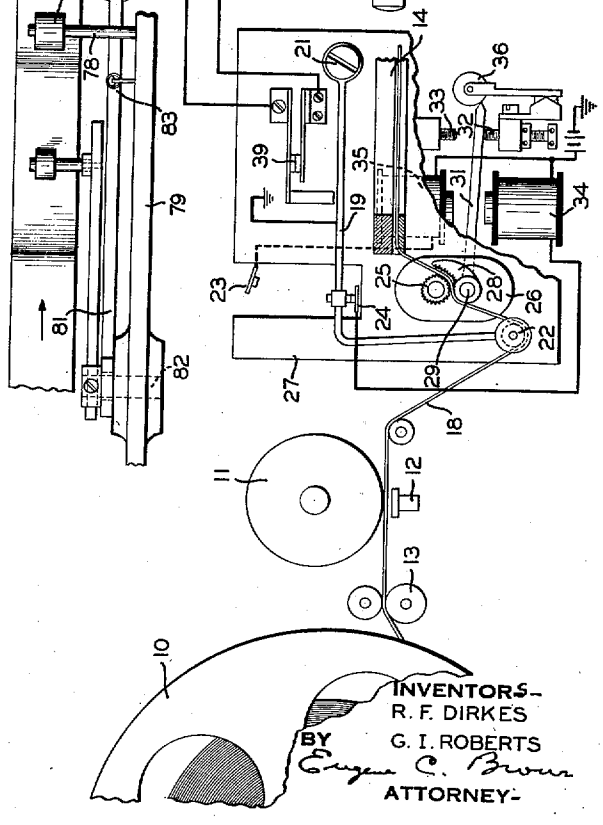
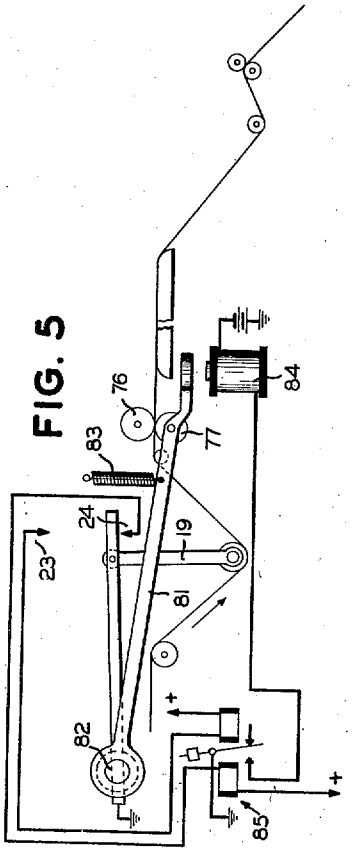


FIG. 5



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FIG. 2

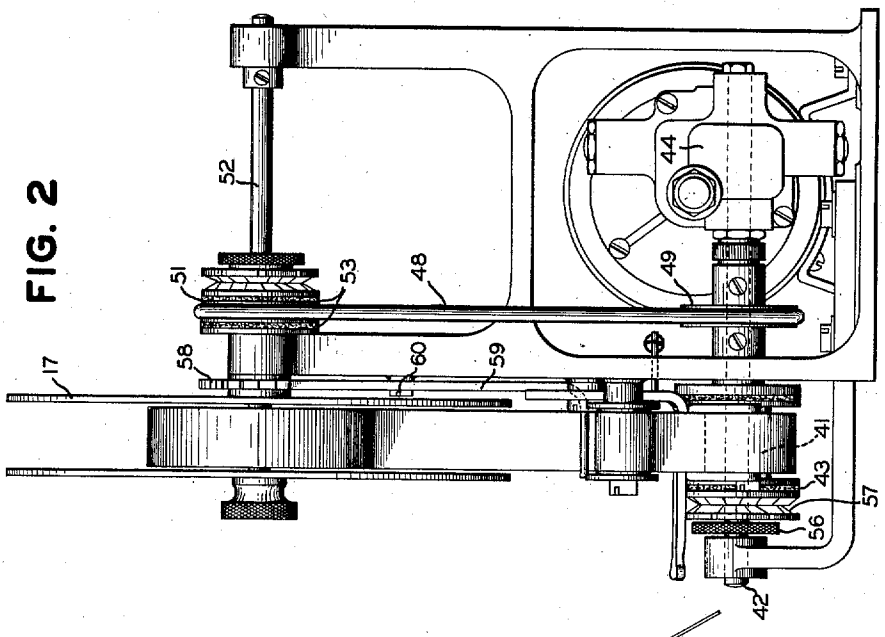


FIG. 3

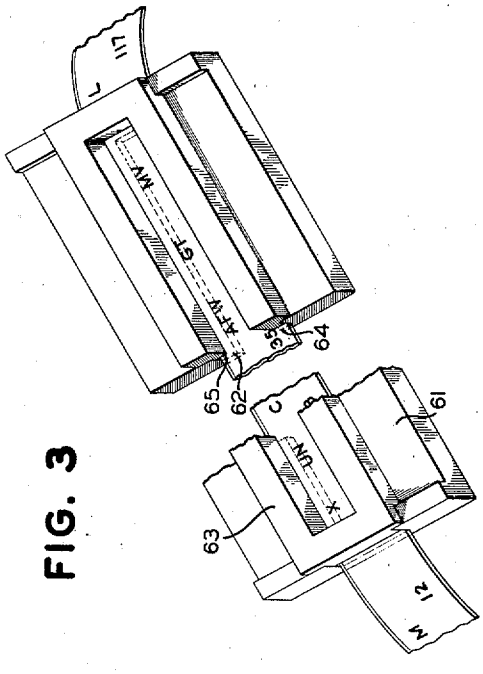
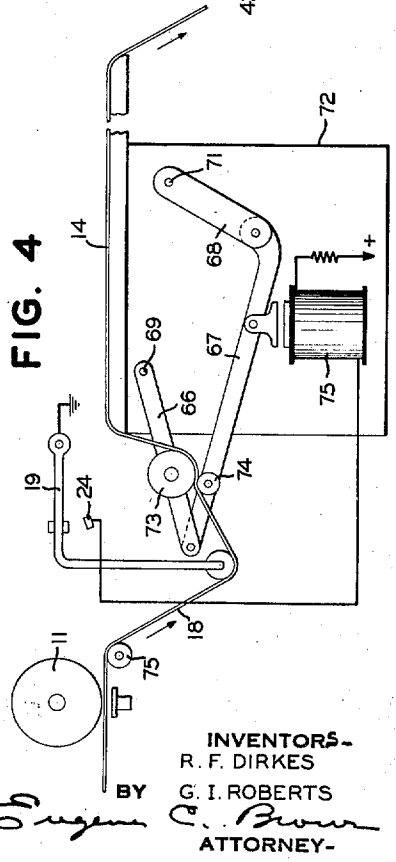


FIG. 4



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UNITED STATES PATENT OFFICE

1,968,818

TAPE CONTROL FOR PROJECTORS

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Application August 1, 1931, Serial No. 554,574

17 Claims. (Cl. 178—42)

This invention relates to a telegraph printing and projecting system in which information printed upon a tape is projected upon a screen for observation. More particularly the invention relates to means for controlling the feeding of the tape through the projector so that the projected images will advance across the screen with an even movement so that they may be easily discerned.

Several projection systems are in general use in connection with stock or news items, the ticker printing the quotations or other items of information upon a specially prepared tape from which they are projected onto a screen for simultaneous observation by a large number of persons.

In order to eliminate a jerky motion of the projected image, it is the practice to employ a tape puller operated by an electric motor, which draws the tape through the projector in a continuous movement at substantially the speed at which the tape is ejected from the ticker. A light leaf spring bears on the tape so that a loop is formed between the ticker and the projector to absorb the jerky motion by which the tape is fed out of the ticker. A switch lever having its free end resting in the loop controls the operation of the tape puller, either through contacts in the motor circuit or through a clutch intermediate the motor shaft and the tape puller, or in some other suitable manner.

At certain relative speeds of operation of the ticker and of the tape puller, however, the switch lever may take a critical position with relation to its contacts, so that the tape puller starts and stops for substantially each character or small group of characters printed, thereby producing a jerky image on the screen.

In a co-pending application, Ser. No. 499,588, filed December 2, 1930, of which the present application is a continuation in part, we have disclosed means for eliminating this difficulty in accordance with which we operate the tape puller by a continuously running motor through a positive clutch, and disengage the clutch by means of a magnet or other suitable device to stop the operation of the tape puller. The circuit to the magnet is either opened or closed, to effect engagement of the clutch whenever a loop of sufficient size has accumulated between the tape printer and the projector. When the circuit has been conditioned so as to start the tape moving through the projector, it cannot be altered to disengage the clutch until the loop of the tape has decreased to a size below that at which it caused engagement of the clutch, equivalent to a predetermined number of characters, as for instance five or six. Conversely, once the tape puller has been stopped it cannot be started again until the loop increases in length an amount equivalent to said predetermined number of characters.

One of the objects of the present invention is to provide a tape puller having these same characteristics in which the positive clutch is eliminated and the control of the tape obtained in a more simple and smoother manner.

Another object is to provide a tape puller employing a continuously operating motor and a slip or friction clutch in which the tape, after it has been brought to rest will continue at rest until a predetermined or measured amount of tape has again accumulated between the ticker and the projector.

A further object is to control the speed of the tape puller in accordance with the amount of accumulated tape ahead of the projector.

A still further object is to provide a tape puller arrangement for a ticker tape projector in which there will be a minimum of interruptions in the movement of the tape and in which the transition from one condition of movement or rest to another will be effected gradually and smoothly.

Other objects and advantages of the invention will hereinafter appear.

In accordance with our present invention the tape is drawn through the field of the projector by a constantly acting motor, the tape being arrested, by a gripping or snubbing action on the tape, whenever the loop between the ticker and projector decreases to a predetermined minimum. Preferably, we employ an electric motor operating through a slip clutch to pull the tape and control the speed of the motor by means of appropriate resistances in accordance with the amount of unprojected tape at any time. As long as the supply of unprojected tape exceeds a definite amount, the motor is operated at full speed and as the supply diminishes the speed of the motor is decreased. Consequently, with a slow market the average speed of the tape is reduced so that the quotations remain on the screen for a longer period and the interruptions in the movement of the tape are less frequent. Due to the inertia of the motor armature changes from one speed to another occur gradually so that a smooth movement of the tape results. The speed of the motor may be varied by any number of increments but we have found that satisfactory control is obtained by employing two speeds only.

When the tape becomes taut, the tape snub-

bing device operates to arrest the movement of the tape but since the tape is moving at relatively slow speed at this time the interruption is not sudden, as in the case of previous types of projectors in which the tape puller operates at a speed slightly greater than the maximum speed of the ticker at all times.

After the tape has come to rest it is held stationary until a predetermined and appreciable amount of tape has again accumulated between the ticker and the projector. Consequently, after movement of the tape again starts it will continue for a considerable period, thereby eliminating the constant starting and stopping of the tape, which otherwise occurs when the ticker is ejecting the tape at a slower rate than that at which the tape puller is capable of taking it up.

In order that the invention may be more fully understood reference will be had to the accompanying drawings in which:

Figure 1 is a front elevation of a tape pulling and control arrangement embodying our invention;

Figure 2 is a side elevation of the tape pulling mechanism;

Figure 3 is a perspective view of the tape guide;

Figure 4 is a somewhat diagrammatical view of a modified form of tape control mechanism;

Figure 5 illustrates a still further modification of the invention; and,

Figure 6 is a plan view of the modification shown in Figure 5.

Referring first to Figure 1, the tape which is contained upon a reel 10 is fed through a ticker or other printing telegraph apparatus represented conventionally by the type wheel 11, platen 12 and feed rollers 13. The feed rollers serve to step the tape forward intermittently as the printing occurs thereon. Obviously, any type of tape printer may be employed operated either by a uniform code, such as the Baudot code, or by step-by-step signals. The tape is drawn through a guide 14 extending across the field of a projector, not shown, by means of a tape puller indicated generally at 15, driven by an electric motor 16 through a slip clutch which will be subsequently described. The tape is rewound upon a reel at 17.

The tape puller is geared to operate at a maximum speed slightly greater than the maximum output of the printer and in order that the movement of the tape across the field of the projector will be smooth, a loop 18 of tape is allowed to form between the printer and the guide 14. The movement of the tape across the guide is controlled by the size of the loop 18 by means of an auto-control arm 19, pivoted at 21 and having its depending end 22 resting in the loop of the tape. The arm 19 moves between two electrical contacts 23 and 24. When a loop of sufficient size occurs the arm 19 rests upon its lower contact 24, as shown.

For the purpose of arresting the movement of the tape when the loop decreases to a minimum size we provide a snubbing arrangement comprising a knurled stud 25, mounted upon a plate 26 carried in turn by the main supporting plate 27 of the control apparatus. A snubbing member 28, carried by a pin 29 journaled in the plate 27 is adapted to be moved into engagement with the stud 25 to grip the tape therebetween. The snubbing member 28 is operated by an armature 31, rigid with the pin 29 and disposed at the opposite or back side of the plate 27. The armature 31 is movable between two adjustable stops 32 and 33 by oppositely disposed electro-magnets 34 and 35. The armature is held in either set position by means of a spring pressed jockey roller 36. The magnet 34 is included in circuit with the lower contact 24 and the magnet 35 is in circuit with the upper contact 23.

The motor 16 is operated from the power mains 37 through a resistance 38. The resistance is short circuited through a pair of contacts 39, whenever the loop of tape exceeds a definite size. These contacts are adapted to be opened by the upward movement of the auto-control arm 19 to include the resistance in the motor circuit and thereby reduce the speed of the motor.

The operation of the tape control mechanism is as follows. Assuming a sufficient accumulation of tape to have occurred to enable the auto-control arm to rest on its lower contact 24, the magnet 34 will be operated to move the snubbing member 28 away from the roller 25 so as to permit the tape to be drawn freely through the guide 14 by the tape puller 15. At this time the contacts 39 will be closed, short-circuiting the resistance 38 and permitting the motor to operate at full speed. If the tape is supplied from the ticker at approximately the same speed as it is drawn across the field of the projector by the tape puller 15, the loop 18 will remain substantially constant and a steady movement of the tape will result. If the ticker operates slightly slower than the tape puller, which is the normal condition, the loop of tape will gradually decrease raising the auto-control arm until it engages the contacts 39 to open the same, thereby including the resistance 38 in the motor circuit and decreasing the speed thereof. The speed of the motor may be decreased any desired amount but we have found satisfactory control to be obtained by reducing the speed about one-half of its maximum speed. The tape does not immediately change its speed, however, due to the inertia of the motor armature but gradually assumes the reduced speed. If the tape puller now operates at a slower rate than that at which the tape is ejected from the ticker, the loop 18 will again increase permitting the contacts 39 to again close so as to again increase the motor speed. By providing a relatively large difference in speed of operation of the motor a considerable range in the speed of operation of the ticker is provided in which it may operate without having the loop of tape reduced sufficiently to render it necessary to arrest its movement entirely. That is, the tape will alternate between high and low speed for a considerable range of speed of the ticker.

However, should the ticker operate below the slowest speed of the tape puller, the loop 18 will eventually be reduced sufficiently to raise the auto-control arm 19 into engagement with its upper contact 23 at which time the upper magnet 35 will be energized attracting the armature 31, thereby moving the snubbing member 28 against the stud 25 and arresting the movement of the tape. The snubbing member is locked in each set position by the jockey roller 36. Consequently, the tape remains at rest until a new loop is formed sufficient to permit the auto-control arm to engage its lower contact 24 at which time the magnet 34 will be energized again to release the tape. By delaying the movement of the tape until an appreciable quantity of tape has accumulated, frequent starting and stopping or jerky movement of the tape is eliminated.

The tape pulling mechanism includes a roller 41 loosely mounted upon a shaft 42 and driven thereby through friction clutch 43. The shaft 42 is driven through suitable reduction gearing contained within a housing 44 by the electric motor 16. A roller 44 mounted upon a pivoted arm 46 presses the tape against the feed roller 41 by means of a spiral spring 47. The take-up reel 17 is operated from the shaft 42 by means of a belt 48 extending around a pulley 49 fixed to the shaft 42 and a second pulley 51 loosely mounted upon the shaft 52 of the reel 17. The shaft 52 is driven from the pulley 51 through a friction clutch 53. The tape passes from the guide 14, under an idler roller 54, thence between the rollers 41 and 44 and over a second idler roller 55 to the reel 17. The tension of the friction clutch 43 may be adjusted by the nut 56, acting on the spider springs 57 so as to cause the tape to be drawn readily across the guide 14, when the gripping member 28 is disengaged from the tape but to slip freely when the member 28 is held in contact with the tape.

The friction clutch 53 controlling the reel 17 has a variable load thereon, increasing as the diameter of the tape on the reel increases. Consequently, if the clutch is adjusted to carry the maximum load imposed by a full reel, it may exert too strong a pull on the tape when the reel is empty, resulting in the dragging of the tape through the gripping members 25 and 28. To avoid this difficulty we provide a control mechanism for the reel 17 comprising a detent wheel 58, fixed to the shaft 52 to rotate with the reel and a detent lever 59 pivoted at 60, and having one free end engaging the detent wheel and the other free end extending across the path of the tape between the roller 55 and the reel 17. The detent lever is held out of contact with the wheel 58 by a light spring 70. However, when the tape between the roller 55 and the reel becomes taut, the detent is forced into engagement with the detent wheel locking the reel against further movement.

The tape guide 14 is shown in Figure 3 as comprising a lower rectangular frame 61 having its inner edges rabbeted or grooved as at 62, and an upper rectangular frame 63 having a downwardly extending flange 64, engaging in the rabbet but spaced from the lower wall thereof so as to provide a groove 65 adapted to engage the margins only of the tape to guide the same across the field of the projector. The groove 65 has a height somewhat greater than the thickness of the transparent tape so that the tape passes loosely therethrough. This feature is of considerable importance since with the usual type of support for the tape, the tape is engaged either at its margin or along its center portion by the usual J-spring or similar device for holding the tape firmly down on to the support. These tape engaging devices mark the tape and in the case of translucent paper tapes, they tend to cause the tape to tear, particularly if weak spots occur therein. Moreover, dust and lint are scrapped from the tape by these engaging devices and accumulate thereat, breaking loose from time to time and moving across the field of the projector in tufts and producing an unsightly appearance on the screen. By spacing the upper frame 63 slightly above the tape, this defect is entirely avoided and at the same time there is no tendency for the tape to buckle or wrinkle across the field of the projector. The upper frame 63 may rest lightly in the lower frame and may be readily removed therefrom when it is necessary to insert a new reel of tape therein.

We have shown in Figure 4 a modified form of tape gripper comprising a series of links, 66, 67 and 68, links 66 and 68 being pivoted at 69 and 71 respectively, to a plate 72, and having the link 67 pivoted to their free ends.

A tape gripping roller 73 is mounted upon the link 66 and a cooperating gripping stud 74 is carried by the link 67. The tape passes from beneath the type wheel 11 over a roller 75, beneath the auto stop arm 19 and between the roller 73 and stud 74 and thence across the tape support 14. When the tape loop 18 is of sufficient size to permit the control arm 19 to rest on its lower contact 24, the magnet 75 is energized, attracting the link 67, drawing the same down so as to widen the angle between the links 66 and 67, thereby moving the gripping roller 73 and stud 74 out of contact with each other and releasing the tape so that it may be drawn freely across the field of the projector.

As the tape loop decreases in size it effects an upward pull on the roller 73, raising the link 66 and with it the link 67, thereby decreasing the angle between the same and eventually bringing the roller 73 and stud 74 again into contact to grip the tape. After the rollers have once been brought into gripping relation with the tape they are definitely held in contact by the tension applied to the tape irrespective of the amount of slack tape accumulating to the left thereof, so that once the tape has been brought to rest it will not be again set in motion until it is of such a size as to permit the control arm 19 to engage its lower contact 24 and energize the magnet 75 to again pull the link 67 downward. It will be understood, of course, that the auxiliary contacts 39 of Figure 1, for controlling the motor circuit, may also be employed in the embodiment of Figure 4.

In Figures 5 and 6 we have shown a still further modification in which the motion of the tape is arrested by the gripping action of a roller 77 and a cooperating fixed roller 76. The roller 76 is carried on a shaft 78, extending from the frame member 79 (Figure 6) and roller 77 is rigidly mounted upon an arm 81, pivoted on the shaft 82. It is urged towards the roller 76 into contact with the tape by a coiled spring 83 and is adapted to be held out of contact with the tape by an electro-magnet 84. The tape lever 19 is also mounted upon the shaft 82 and plays between the upper and lower contacts 23 and 24 respectively, which control the operation of a biased polar relay 85. The relay 85 operates to energize the magnet 84 when a loop of tape of a predetermined size forms, thereby separating the rollers 76 and 77 to permit the tape to be drawn through the field of the projector by the tape pulling mechanism. The lever 19 is shown in Figure 5 approaching its lower contact just prior to disengaging the gripping rollers 76 and 77. After the movement of the tape has started and the loop again decreased sufficiently to raise the lever 19 into engagement with its upper contact 23, relay 85 operates to its opposite side, deenergizing the magnet 84 and permitting the roller 76 to be lifted into engagement with the roller 77 to grip the tape therebetween and arrest its movement.

Obviously numerous other modifications of the invention will occur to those skilled in the art and, therefore, we do not desire to be limited to

the exact details shown and described, except in accordance with the appended claims.

What we claim is:

1. In combination, a tape printing apparatus adapted to eject tape therefrom, a support, means for feeding tape across said support, gripping means intermediate said printing apparatus and tape feeding means, said gripping means being movable away from the tape to permit free movement thereof over said support and being movable against the tape to stop the motion thereof across the support, when there is a predetermined minimum length of tape between said printing apparatus and support, and means for maintaining said gripping means in engagement with the tape until a length of tape, corresponding to a predetermined plural number of characters, has been ejected by said printing apparatus.

2. In combination, a telegraph printing apparatus adapted to eject tape therefrom, a support, a tape puller for moving said tape across the support, tape engaging means operable to grip the tape to arrest its motion when there is a predetermined amount of tape between the printing apparatus and support, and electro-magnetic means for releasing the tape after a predetermined length thereof, corresponding to a plural number of characters, has been ejected by the printing apparatus.

3. In combination, a tape supply, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said tape supply and support, a tape engaging device adapted to move into position to grip the tape, to arrest its movement when said loop decreases to a predetermined minimum size and to move into position to release the tape when the loop increases to a predetermined larger size and means for locking the tape engaging device in one or the other of said positions when the loop is of an intermediate size.

4. In combination, a tape supply, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said tape supply and support, a tape engaging device, electromagnetic means adapted to move said tape engaging device into position to grip the tape, to arrest its movement when said loop decreases to a predetermined minimum size, and into position to release the tape when the loop increases to a predetermined larger size and means for locking the tape engaging device in one or the other of said positions when the loop is of an intermediate size.

5. In combination, a telegraph printing apparatus adapted to eject tape therefrom, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said printing apparatus and support, an arm riding in said loop and having upper and lower limits of movement, corresponding to a difference in the length of the loop of several characters, a tape gripping device movable into engagement with the tape to arrest its movement when the arm is in its upper limit and means for maintaining said gripping device in engagement with the tape to hold the tape at rest until said arm reaches its lower limit of movement.

6. In combination, a telegraph printing apparatus adapted to eject tape therefrom, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said printing apparatus and support, an arm riding in said loop and having upper and lower contacts, corresponding to a difference in the length of the loop of several characters, a tape arresting device, oppositely disposed magnets arranged to move said tape arresting device into and out of engagement with the tape when said arm is on its upper and lower contacts respectively and means for maintaining said tape arresting device in its previously set position when the contact arm is between its contacts.

7. In combination, a tape supply, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said tape supply and support, a tape arresting device, oppositely disposed magnets adapted to move said arresting device into and out of engagement with the tape when said loop varies between predetermined limits of size.

8. In combination, a tape supply, a support, a tape puller for moving said tape across said support, means for forming a loop of tape between said tape supply and support, a tape arresting device, oppositely disposed magnets having a common armature adapted to move said tape arresting device into and out of engagement with the tape when said loop varies between predetermined limits and means for holding said armature in its previously set position when said loop is of an intermediate size.

9. In combination, a source of tape, a tape support, a tape puller, means for operating said tape puller at one speed when a predetermined amount of tape forms between the source and support, and means for operating said tape puller at an appreciably lower speed when the tape between the source and support decreases to a predetermined amount, means to arrest the movement of the tape when the tape between the source and support decreases to a still smaller amount and means for maintaining said tape at rest until an appreciable amount thereof corresponding to a plurality of characters again accumulates between the source and support.

10. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape to form between the source and support, an arm riding in said loop, having two limiting positions so spaced as to correspond to a difference of several characters in the loop of tape, means for arresting the movement of the tape when the arm is one limiting position, means for releasing the tape when it is in the other limiting position and means for reducing the speed of the tape when the arm is in an intermediate position.

11. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape to form between the source and support, an arm riding in said loop having upper and lower contacts in its two limiting positions, means in circuit with the upper contact for arresting the movement of the tape when the arm is in its upper position, means in circuit with the lower contact for releasing the tape when the arm is in its lower position and an auxiliary contact for reducing the speed of the tape when the arm is in an intermediate position.

12. In combination, a source of tape, a support, a tape puller, a tape gripping device movable into contact with the tape when said tape becomes taut between the source and support, for arresting the movement of the tape, said gripping device maintaining the tape at rest by the tension applied by the tape puller until a predetermined amount of tape has been released from said source.

13. In combination, a source of tape, a support, a tape puller, tape arresting means comprising a

pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut to move the gripping devices into contact with the tape to arrest the movement thereof.

14. In combination, a source of tape, a support, a tape puller, tape arresting means comprising a pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut, to move the gripping devices into contact with the tape to arrest the movement thereof, said gripping devices being held in engagement with the tape by the tension of said tape puller independently of the tautness of the tape between the source and support and means controlled by an accumulation of tape between the source and support for releasing said gripping devices.

15. In combination, a source of tape, a support, a tape puller, tape arresting means comprising a pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut, to move the gripping devices into contact with the tape to arrest the movement thereof, said gripping devices being held in engagement with the tape by the tension of said tape puller independently of the tautness of the tape between the source and support and means independent of said gripping devices for releasing the same.

16. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape varying in length between two limits to form between the source and the support, means for arresting the movement of the tape when the length of the loop has reached one limiting position, means for releasing the tape when it has reached the other limiting position and means for reducing the speed of the tape when it reaches a certain intermediate position.

17. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape having a length varying between two limits corresponding to a difference of several characters in the tape, to form between the source and the support, means disposed between the source and the support acting to arrest the tape when the length of the loop has reached one limiting position and acting to release the tape when the length of the loop has reached the other limiting position.

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DISCLAIMER

1,968,818.—*Robert F. Dirkes*, Jamaica, and *George I. Roberts*, New York, N. Y. TAPE CONTROL FOR PROJECTORS. Patent dated August 7, 1934. Disclaimer filed August 3, 1938, by the assignee, *The Western Union Telegraph Company*.

Hereby enters this disclaimer to claims 2 and 9 of said Letters Patent.

[*Official Gazette August 30, 1938.*]

pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut to move the gripping devices into contact with the tape to arrest the movement thereof.

14. In combination, a source of tape, a support, a tape puller, tape arresting means comprising a pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut, to move the gripping devices into contact with the tape to arrest the movement thereof, said gripping devices being held in engagement with the tape by the tension of said tape puller independently of the tautness of the tape between the source and support and means controlled by an accumulation of tape between the source and support for releasing said gripping devices.

15. In combination, a source of tape, a support, a tape puller, tape arresting means comprising a pair of links, a tape gripping device carried by each of said links, the links being interconnected so that as one is moved, the tape gripping devices are brought together, said tape passing between the gripping devices and being arranged to move one of said links, as the tape between the source and support becomes taut, to move the gripping devices into contact with the tape to arrest the movement thereof, said gripping devices being held in engagement with the tape by the tension of said tape puller independently of the tautness of the tape between the source and support and means independent of said gripping devices for releasing the same.

16. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape varying in length between two limits to form between the source and the support, means for arresting the movement of the tape when the length of the loop has reached one limiting position, means for releasing the tape when it has reached the other limiting position and means for reducing the speed of the tape when it reaches a certain intermediate position.

17. In combination, a source of tape, a tape support, a tape puller, means for permitting a loop of tape having a length varying between two limits corresponding to a difference of several characters in the tape, to form between the source and the support, means disposed between the source and the support acting to arrest the tape when the length of the loop has reached one limiting position and acting to release the tape when the length of the loop has reached the other limiting position.

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