July 21, 1936. G. M. YORKE ET AL 2,048,311

TAPE FEED FOR PRINTED STRIPS

Filed July 11, 1923 2 Sheets-Sheet 1

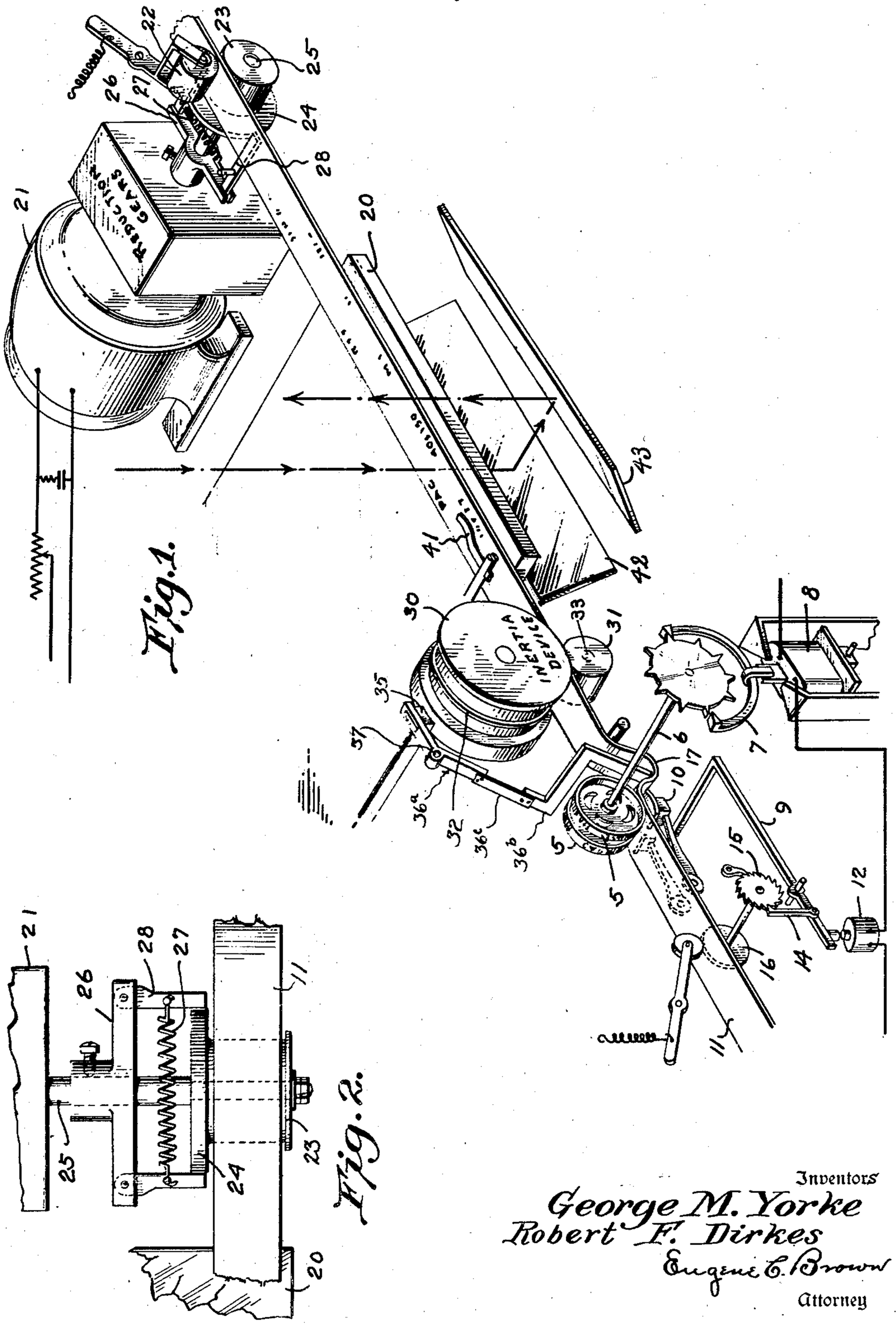

Fig. 1.

Fig. 2.

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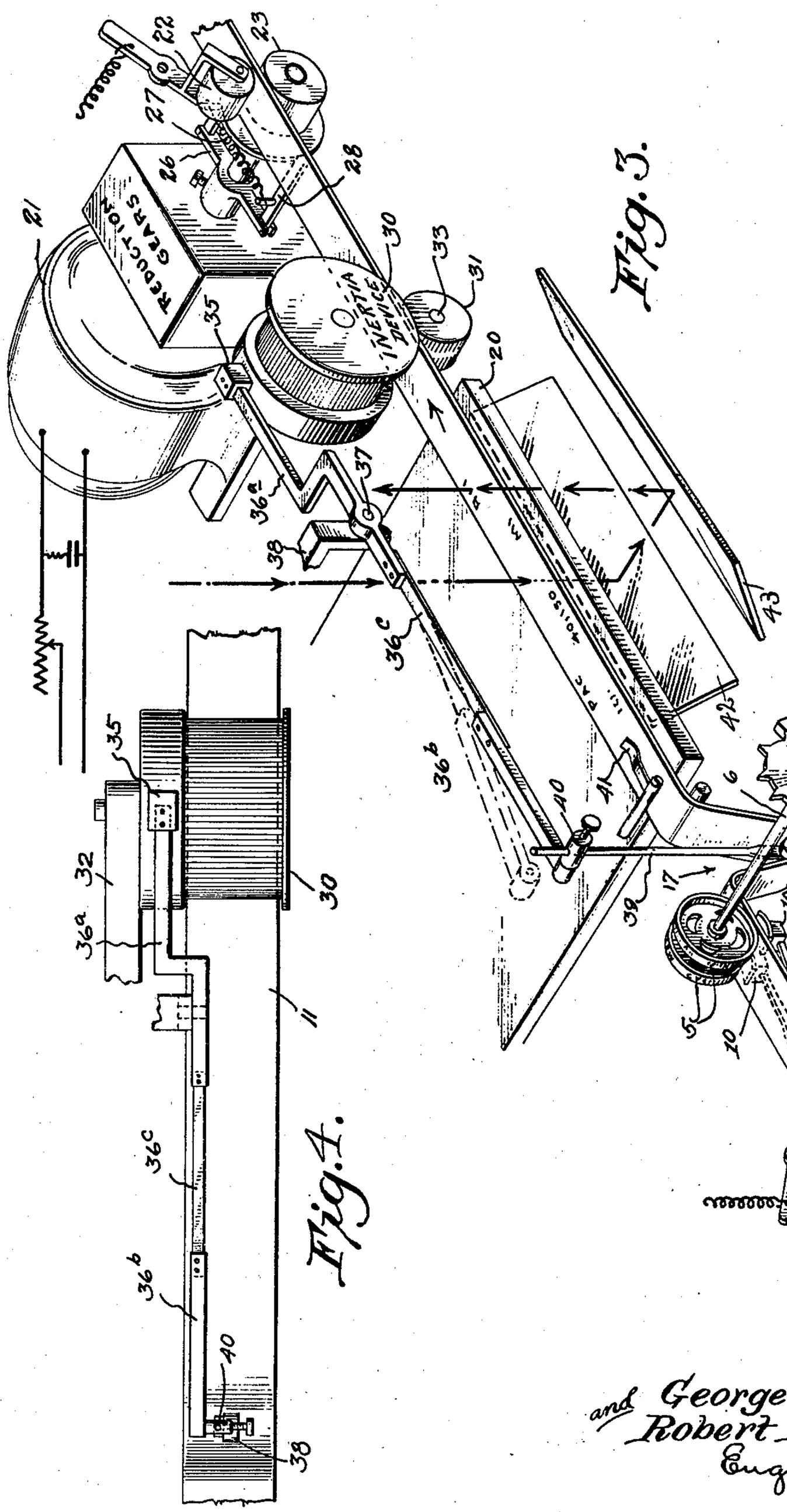

Fig. 3.

Fig. 4.

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TAPE FEED FOR PRINTED STRIPS

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28 Claims. (Cl. 271—2.3)

This invention relates to a method of and means for moving narrow strips, ribbons or tape with a smooth even motion and is especially intended to coact with an intermittent feed mechanism in a manner to prevent the transmission of any jerks or sudden movement to the ribbon, strip or tape. Our invention is particularly useful in actuating the strips which issue from certain types of printing machines when it is desired to expose the printed matter to view as it passes over a table or exposure area.

One of the main purposes of our invention is to provide a means for causing a tape, which is fed intermittently from a printing apparatus, to move over an exposure area with a gradual acceleration and a gradual retardation entirely free from sudden jerks. The tape may be viewed either directly or by reflection upon a screen for long periods without eye strain or fatigue. For the purpose of explaining the operation of the invention we have illustrated its use in connection with the well known stock ticker found in brokers' offices and elsewhere.

Another object is to provide a tape pulling mechanism for such apparatus in which there is always a certain dwell between the stopping of the tape and the starting thereof, whereby several characters will be advanced into the field of the projector upon each movement of the tape, thus eliminating the usual step-by-step movement of the characters across the screen should the printer be operated at a slow rate.

Other objects and advantages of the invention will appear from the following description:

In accordance with our invention the tape is drawn through the field of the projector by a constantly running member acting through a slip clutch, the tape being arrested by a gripping or snubbing action on the tape whenever the loop of tape between the ticker and the projector decreases to a predetermined minimum.

The tape snubber comprises a pair of gripping members between which the tape passes, the gripping members normally permitting the tape to move freely therebetween when a predetermined accumulation or loop of tape occurs. The gripping members may comprise a pair of rollers which revolve freely as tape is pulled therebetween and, if desired, one of the rollers may constitute an inertia device to retard the starting and stopping of the tape whereby a gradual acceleration and deceleration thereof is obtained. In the preferred embodiment of the invention the snubbing or inertia roller is carried on a pivoted arm and rests freely on the tape. It may be controlled by a lever bearing in a loop of the tape which serves to press the snubbing roller towards the tape and into firmer engagement therewith as the loop decreases, thereby finally arresting the movement of the tape. Preferably a resilient connection is provided between the tape lever and the roller whereby the lever applies a gradually increasing pressure to the roller, thereby applying the retarding force to the tape in a gradual manner and causing its movement to be slowly retarded. The momentum of the roller assists in the slow stopping of the tape.

After the tape has been brought to rest, the inertia of the roller and the force stored in the resilient connection maintain the tape at rest until a new loop of tape accumulates between the ticker and the projector. Consequently, after the movement of the tape again starts, it will continue for a considerable period, thus eliminating the constant starting and stopping of the tape which otherwise occurs when the ticker is ejecting tape at a slower rate than the puller is capable of taking it up. As the pressure is gradually released from the snubbing roller, it moves slightly away from the abutment releasing the tape and permitting it to again slowly accelerate up to normal speed.

The invention will be more fully understood by reference to the detailed description given below.

In the accompanying drawings, Figure 1 is an illustrative perspective view of the essential parts embodied in our invention; Figure 2 is a fragmentary top plan view of the friction clutch device on the shaft of the driving motor; Figure 3 is a perspective view of the apparatus shown in Fig. 1 but with the inertia device located at the opposite side of the exposure area or table; and Figure 4 is a top plan view of the inertia device.

Inasmuch as the stock ticker tape printer is a familiar apparatus in all parts of this country, we have merely indicated the principal parts, such as the printing wheel 5 which carries on its divided periphery the letters and figure characters, the shaft 6 being actuated by the usual self-winding device under the control of the escapement 7, which is oscillated by the magnet 8 in the ticker circuit. The lever 9 which raises one or the other printing hammer 10 to press the tape 11 against either a figure or a letter character on the printing wheel, is actuated by the press-magnet 12. On the return stroke of the lever 9, the pawl 14 moves the ratchet wheel 15 and thereby causes the feed wheel 16 to feed the

tape intermittently into the space 17, thus forming a slack portion or loop in the tape.

The tape is pulled across the exposure area, which may be a glass table or support 20, by means of an electric motor 21. The motor operates continuously and drives the pulley or spool 23 by means of an interposed friction clutch having a yoke member 26 carrying clutch shoes 28 which are pressed against the flange 24 of the pulley by the spring 27 and as they are rotated, exert a constant drag tending to rotate the pulley, thereby subjecting the tape to a constant pull or tension.

It has heretofore been proposed to stop the pulling motor by means of an escapement device which moves into the path of a revolving part of the motor, the device being actuated by the loop portion of the tape but this was never used in practice because of the sudden movements imparted to the tape. It has also been proposed to stop the tape by clamping it between a fixed support and the end of a lever controlled by the loop portion. This also is objectionable because of its sudden operation which produces momentary jerks on the tape that tire the eyes of observers who are reading the printed matter.

We have overcome these defects which prevented the commercial use of said prior devices by imparting to the tape an inertia effect which is retarded in accordance with the feed of the tape. For this purpose an inertia roller 30 is arranged to bear upon the tape. The roller may be positioned and guided by securing its axle pin to a pivoted lever 32 as shown in Fig. 4. The tape passes between the roller 30 and a roller or abutment 31 mounted on a fixed pin 33. Coacting with the roller 30 is a pressure shoe 35, carried by the shorter arm 36^a of a lever which is pivoted at 37 to a bracket 38 as shown in Fig. 3. The longer lever arm is preferably formed of a rigid portion 36^b and a flexible spring portion 36^c. In the form shown in Fig. 1, the roller is provided with an annular rib or band 32 which bears upon the middle of the tape between the two rows of printed characters. In the arrangement shown in Fig. 3, a small roller 38 resting in the loop of the tape, is carried by a stem 39 which is adjustable in a clamp 40 on the outer end of lever arm 36^b.

The speed of the continuously running motor is adjusted to pull the tape across the exposure area of the table 20, at substantially the same speed that the tape is normally fed into the loop from the ticker. The loop is terminated at the forward edge of the table by the spring pressure finger 41, which also prevents the intermittent motion of the tape from entering the exposure area.

Under normal conditions the loop portion of the tape exerts no pressure on the lever arm 36^b and the pressure shoe 35 rides freely upon the rim of inertia roller 30 applying no pressure thereto. If, however, the ticker should stop or should feed slowly, the loop will gradually shorten and lift the lever arm. The upward movement of the arm 36^b will be transmitted through the arm 36^a to the brake shoe 35. The initial pressure of the shoe upon the rim of the roller 30 will be very slight due to the flexing of the spring portion 36^c, but will then increase as the loop decreases further, forcing the roller 30 into closer contact with the tape and applying a gradual snubbing action thereto. The roller 30 permits the tape to move until a force has been applied to the roller sufficient to overcome both the pull of the tape and the momentum of the roller. The momentum of the roller 30 causes the loop 17 to be decreased to a somewhat smaller size than would otherwise occur, resulting in a further flexing of the spring 36^c and causing the application of a greater pressure on the roller 30. Consequently upon restarting of the ticker the pressure on the roller 30 will not be relieved until the loop has reformed sufficiently to deflex the spring 36^c and release the roller of its pressure, permitting the rollers 30 and 31 to move slightly apart thereby unclamping the tape. The inertia of the roller 30 retards the starting of the tape, however, until the pressure is substantially all removed from the roller. Therefore, a certain lag or dwell occurs between the stopping of the tape and its restarting, the effect of which is to reduce the frequency of starting and stopping. The restarting of the tape is gradual of course so that no jerky motion occurs. It will be seen, therefore, that any change in the movement of the tape must at all times be gradual. Any fluctuations in the speed of the motor will also be compensated by the inertia device.

The apparatus above described may be used in conjunction with a projection apparatus. We have indicated by the lines or arrows that the light rays from a suitable source may pass downwardly through the tape and after a double reflection by the mirrors 42 and 43, pass upwardly to be reflected upon a screen in the manner well understood. When used in this manner the projected images move across the screen with a steady movement, free from any flicker or jerks such as are found in prior devices which stop the tape by clamping it against an immovable support. The effect of the revoluble weighted roller in conjunction with the tape-controlled brake, gives to the tape moving across the exposure area an inherent inertia, which nullifies any tendency to sudden movement.

We claim:—

1. In apparatus for recording data upon a tape and ejecting the tape therefrom with an intermittent motion, means to support the tape over an exposure area, an inertia-creating device having its weight bearing upon the tape adjacent the initial end of said area and means for pulling the tape across said area.

2. In apparatus for recording data upon a tape and ejecting the tape therefrom with an intermittent motion, means to support the tape over an exposure area, an inertia-creating device having its weight bearing upon the tape, a driving pulley engaged by the tape, a continuously operating motor, and a friction clutch interposed between said motor and said pulley.

3. In apparatus for recording data upon a tape and ejecting the tape therefrom with an intermittent motion, a support across which said tape is adapted to be fed, said tape normally having a loop therein between said recording device and said support, a rotatable roller having its weight bearing upon the tape adjacent said support, a pulley over which the tape passes, a continuously operating motor and a friction clutch connecting the motor and pulley.

4. In apparatus for recording data upon a tape and ejecting the tape therefrom with an intermittent motion, a support across which said tape is adapted to be fed, said tape normally having a loop therein between said recording device and said support, a rotatable roller having its weight bearing upon the tape, a continuously operating motor, a pulley rotatably mounted on the motor shaft which is engaged by the tape, and a friction clutch interposed between the motor shaft and

the pulley, the inertia of said roller causing a gradual acceleration of the tape during the starting period.

5. In an apparatus for printing data upon a movable tape and ejecting the printed tape therefrom with an intermittent motion, means to support the tape over an exposure area, means to exert a constant tension on the tape comprising a continuously operating motor, a revoluble body bearing upon the tape and rotated thereby, and means for exerting a braking action on said body which varies inversely with the speed of said intermittent motion.

6. In an arrangement for projecting data from a tape ejected from a recording device with an intermittent motion, the method of feeding the tape across the projecting position with a continuous motion having a gradual acceleration and a gradual retardation which includes the steps of utilizing the inertia of a revoluble body bearing upon the tape and controlling the accelerating and retardation periods by movement of the part of the tape having intermittent movement.

7. In an arrangement for projecting data from a tape ejected from a recording device with an intermittent motion, the method of feeding the tape across the projecting position with a continuous motion having a gradual acceleration and a gradual retardation which includes the steps of forming a loop in the tape where it is moving intermittently, utilizing the inertia of a revoluble body bearing upon the tape to control the movement thereof and retarding the movement of said body inversely with the depth of the loop.

8. In an arrangement for projecting data from a tape ejected from a recording device with an intermittent motion, the method of feeding the tape across the projecting position with a continuous motion having a gradual acceleration and a gradual retardation which includes the steps of forming a loop in the tape where it is moving intermittently, exerting a constant tension upon the tape beyond the projecting position, utilizing the inertia of a revoluble body bearing upon the tape to control the movement thereof and retarding the movement of the tape inversely with the depth of the loop.

9. In an organization for projecting data from a tape, ejected from a data recording device with an intermittent motion, the method of moving the tape through the projecting position with a smooth even motion which includes the step of utilizing the inertia of a movable body bearing upon the tape.

10. In an organization for projecting data from a tape, ejected from a data recording device with an intermittent motion, the method of moving the tape through the projecting position with a smooth even motion which includes the step of utilizing the inertia of a revoluble body bearing upon the tape.

11. In an organization for projecting data from a tape, ejected from a data recording device with an intermittent motion, the method of feeding the tape through the projecting position with a continuous motion and starting said motion with a gradual acceleration which includes as a step, utilizing the inertia of a revoluble body bearing upon the tape in controlling the motion of the tape.

12. In combination, a source of printed tape including a loop of variable size, a support, means for feeding tape across said support, gripping means intermediate said loop and tape feeding means, and other means engaging in said loop for actuating said gripping means into engagement with the tape to stop the motion thereof across the support, when there is a predetermined minimum length of tape in said loop, said other means maintaining said gripping means in gripping engagement with the tape until a length of tape, corresponding to a predetermined plural number of characters, has been ejected by said printing apparatus.

13. In combination, a source of tape, 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 source of tape and support, said means acting to retain said tape at rest until a predetermined length thereof, corresponding to a plural number of characters, has accumulated between said source and support.

14. In combination a source of tape, a support, means for drawing tape across said support with a continuous movement, a friction device engaging the tape and responding to slack take-up and accumulation, respectively, for arresting the tape and releasing it for movement, and a flexible member engaging said friction device for causing the same to apply a gradually increasing and decreasing pressure to the tape to stop and start it with a gradual retardation and acceleration, respectively.

15. In combination, a source of tape, a support, a continuously operating mechanism for drawing the tape over said support, a tape tensioning apparatus comprising a pivoted lever adapted gravitationally to bear on the tape approaching the support whereby slack take-up between the source and support will raise the same, a roller and an abutment between which the tape passes on approaching the support and means operated by said lever when the latter rises and falls for respectively applying an increasing and decreasing pressure to said roller and abutment.

16. In combination, a source of tape, a support, a continuously operating mechanism for drawing the tape over said support, an abutment over which the tape passes in approaching said support; a tape-tensioning apparatus comprising a lever adapted gravitationally to bear on the tape between said source and said abutment, whereby slack take-up caused by interruption of the supply of tape will raise said lever, a roller adjustably positioned over said abutment, and means positively operated by said lever when the latter rises for moving said roller against said abutment to clamp the tape.

17. In a combination, a source of tape, a support, a tape puller, normally acting to draw the tape over said support, a device for anchoring the tape against movement by said tape puller, said anchoring device consisting of a lever engaging the tape between the source and said support, a friction creating element for cooperating with the tape, means cooperating with said lever and friction creating element to cause said friction creating element to lock said tape against movement when the tape actuates said lever upon interruption of the supply of tape, and means for causing a dwell to take place between the resumption of the tape supply and the release of the tape by said friction creating element.

18. In combination, a source of tape, a support, a continuously operating pulling mechanism for drawing the tape over said support, a tape-

tensioning apparatus comprising a pivoted lever adapted gravitationally to bear on the tape approaching the support, whereby slack take-up caused by interruption of the tape supply will raise said lever, a roller and an abutment between which the tape passes on its way to said support, means operated by said lever when the latter rises for forcing together said roller and abutment, said pulling mechanism comprising a continuously rotating shaft, a tape engaging pulley rotatably mounted on said shaft, and means for releasably locking said pulley to said shaft when said roller and abutment clamp said tape against movement.

19. In combination, a source of tape, a support, a tape puller for drawing tape from said source of supply over said support, a device for anchoring the tape against movement by said tape puller when the supply of tape is interrupted, said anchoring device consisting of a lever engaging the tape, a friction creating element for the tape and means cooperating with said lever and friction creating element to cause said friction creating element to lock said tape against movement when the tape actuates the lever upon the interruption of said supply of tape.

20. In combination, a source of printed tape, a support, means for moving the tape across said support, tape arresting means, means engaged by said tape for movement in a direction to control said tape arresting means to stop the movement of the tape when the supply of tape between the source thereof and the support decreases to a predetermined minimum, said last means being also movable in a direction to control said tape arresting means to release the tape when the supply of tape between the source thereof and the support increases beyond said predetermined minimum and means for delaying the release of the tape until said increase in the supply thereof corresponds to a length of tape occupied by a substantial number of printed characters.

21. In combination, a source of printed tape, a support, a tape puller normally acting to draw the tape over said support, means for rendering said tape puller ineffective to draw the tape over the support upon interruption in the supply of tape, and means for causing a dwell to take place between resumption of the tape supply and the rendering of said tape puller again effective to draw the tape over the support.

22. In combination a source of printed tape, a support across which said tape is adapted to pass, means at the forward end of said support for holding said tape in frictional contact with the support, tape pulling means at the opposite side of the support, a brake associated with the pulling means and means controlled by tension of the tape between the tape source and the pulling means for applying said brake to arrest the movement of the tape across the support.

23. In combination a source of printed tape, a support across which said tape is adapted to pass, means at the forward end of such support for holding said tape in frictional contact with the support, tape pulling means at the opposite side of the support, a continuously operating driving element disposed in frictional driving relation to said pulling means and brake means disposed at the opposite side of said support from said source of supply, said brake means being controlled by tension of the tape for arresting said tape pulling means while permitting said driving element to continue to operate.

24. In combination a source of printed tape, a support across which said tape is adapted to pass, means at the forward end of said support for holding said tape in frictional contact with the support, tape pulling means at the opposite side of the support, a continuously operating driving element disposed in frictional driving relation to said pulling means, brake means disposed at the opposite side of said support from the source of supply and means actuated by a decrease in size of a loop of tape between the said source of tape and the pulling means for controlling said brake means to arrest the tape while permitting said driving element to continue to operate.

25. In combination a source of printed tape, a support across which said tape is adapted to pass, means at the forward end of said support for holding said tape in frictional contact with the support, tape pulling means at the opposite side of the support, a brake associated with the pulling means, a pivoted roller about which the tape is passed and means controlled by pivotal movement of said roller, caused by slack take-up of said tape for actuating said brake to arrest the movement of the tape across the support.

26. In combination a source of printed tape, a support across which said tape is adapted to pass, means at the forward end of said support for holding said tape in frictional contact with the support, a pair of opposed rollers at the opposite side of the support between which said tape passes, a friction brake associated with one of said rollers and means actuated by the tape for applying said brake to arrest the movement of said roller whereby to stop the movement of the tape across the support.

27. In combination a support, a source of tape disposed at one side of said support, a pair of opposed rollers disposed at the opposite side of the support between which said tape passes, a friction brake associated with one of said rollers and means actuated by the tape for applying said brake to arrest the movement of said roller, whereby to stop the movement of the tape across the support.

28. In combination a support, a source of tape disposed at one side of said support, a pair of opposed rollers disposed at the opposite side of the support between which said tape passes and means controlled by slack take-up of the tape for applying a gradual braking action to one of said rollers whereby to arrest the movement of the tape across the support.

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DISCLAIMER

2,048,311.—*George M. Yorke*, New York, and *Robert F. Dirkes*, Jamaica, N. Y. TAPE FEED FOR PRINTED STRIPS. Patent dated July 21, 1936. Disclaimer filed May 13, 1939, by the assignee, *The Western Union Telegraph Company*.

Hereby enters this disclaimer to claims 22, 25, 26, 27, and 28 of the patent.

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