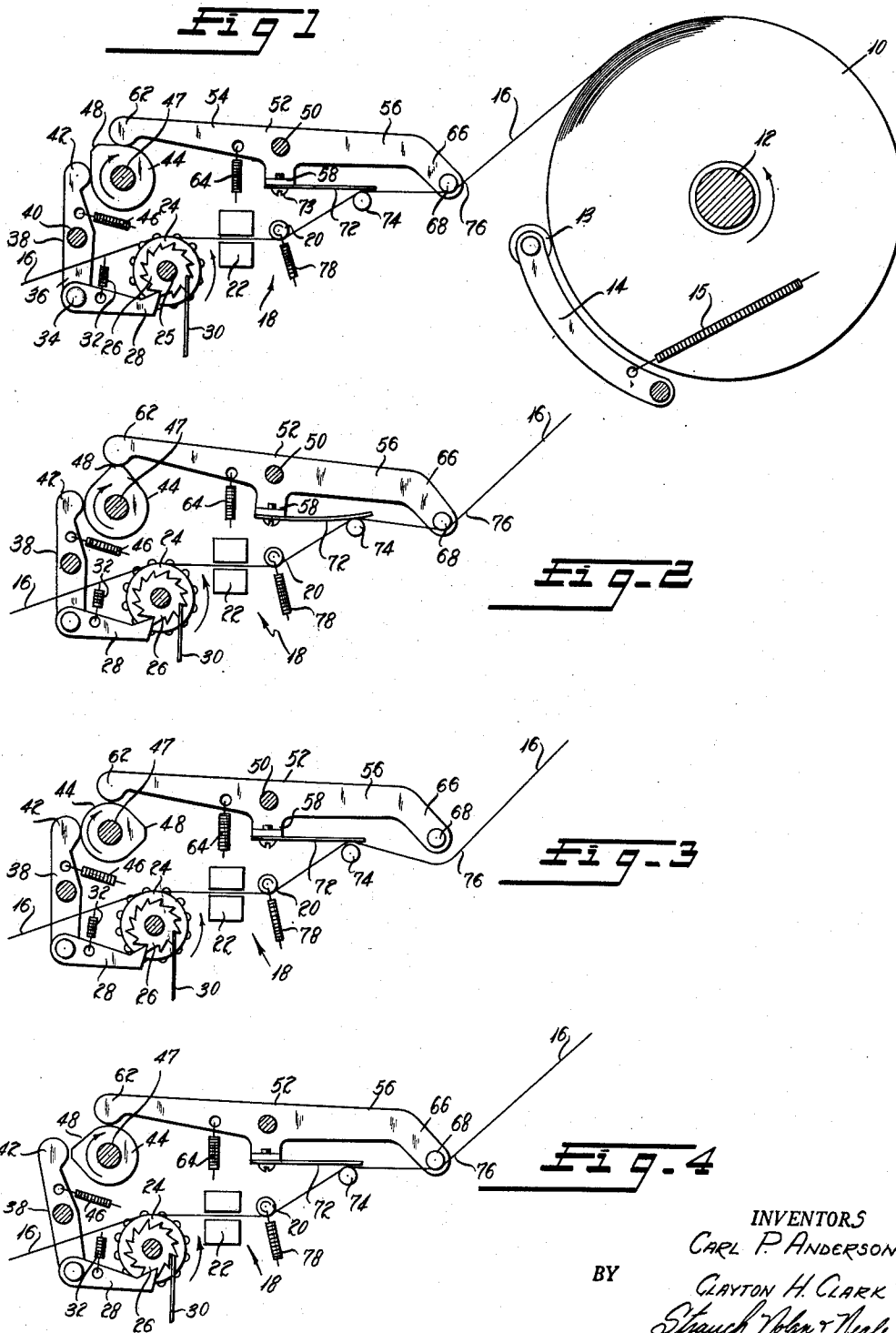


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STRIP HANDLING EQUIPMENT

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INVENTORS
CARL P. ANDERSON
BY
CLAYTON H. CLARK
Strauch, Olson & Thiele
ATTORNEYS

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STRIP HANDLING EQUIPMENT

Carl P. Anderson, Evanston, and Clayton H. Clark, Mundelein, Ill., assignors to Smith-Corona Marchant Inc., a corporation of New York

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This invention relates to strip handling equipment. It has particular reference to equipment for handling record tape which is used in printing telegraph and data processing machines for message and data storage.

Machines of this nature require a continuous supply of recording medium, usually in the form of a paper tape, which is wound on a large supply reel. The tape passes through a work station and its movement is generally accomplished by a sprocket wheel engaging feed holes in the tape and pulling the tape. The feed holes may be punched at the work station, along with the punching of certain code information holes, or the feed holes may be pre-punched in the tape supply. Because a roll of supply tape, sufficient for extended periods of operation of the machine, has considerable weight and inertia, when the tape is pulled from the supply roll by the feed sprocket it has been a common occurrence, with prior art methods of tape pulling, for the tape to be torn in the vicinity of the feed holes or, if not torn between feed holes, the feed holes themselves become so damaged as to render the tape useless for subsequent readout or transmitting purposes. This damage occurs because the portion of the tape intermediate adjacent holes is not strong enough to resist the pulling force sometimes exerted upon the tape to pull it from the heavy supply roll. In overcoming this difficulty it is common practice to provide a loop or slack in the tape between the reel and the work station so the intermittent jerking of the tape by the feed sprocket will not be transmitted through the tape and used to overcome the inertia of a heavy supply roll. In order to maintain this loop or slack in the tape prior art machines generally utilize a device for driving the supply reel and this often entails considerable mechanism, increases production costs and adds to maintenance problems.

The equipment proposed by this invention is a simple auxiliary pivotable lever mechanism that, in the illustrated embodiment, operates during each machine cycle, or it may be constructed to operate more or less times per machine cycle if desired. It operates by exerting a gripping force on the tape between the supply roll and the work station and simultaneously engaging the full width of the tape and moving the tape to a different, longer path between the gripped portion of tape and the roll to pull a portion of the tape from the supply roll, which upon completion of lever actuation creates a slack portion of tape between the roll and the work station. When the mechanism releases its engagement with the tape the work station sprocket feed has only to pull against the slack tape, not the inertia of the heavy supply roll. If it is desired to have continuous feed through the work station, a simple spring biased member between the gripping portion of the tape puller and the work station provides a lightly biased slack in the tape for use in the work station while the tape is being gripped and added slack is being provided by the tape puller. This device removes the load of the tape supply roll from the feeding mechanism at the work station and eliminates tearing or damaging the tape immediately around sprocket feed holes, due to hard pulls or intermittent jerks against the supply roll inertia.

Accordingly, a primary object of this invention resides in the provision of a novel strip pulling mechanism that will draw strip material from a supply device to make a

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slack portion of strip material available to the work station as it is needed.

Another object resides in the provision of a novel mechanism to unwind strip material from a supply reel without requiring the presence of sprocket feed perforations in the supply of strip material and does not use sprocket feed perforations when they are present.

A further object resides in providing a novel mechanism, to unwind strip material from a supply reel, which is readily installed on any of a variety of classes of strip handling machines.

And a further object resides in the provision of a novel tape pulling mechanism with a minimum of inexpensive working parts installed in a novel manner between the tape supply and the work station of a machine, the tape puller being adapted to intermittently grip and pull tape from the tape supply to provide a slack portion of tape ahead of the work station. In certain applications of the tape puller to strip handling machines, tape pulling operations are synchronized to work station cycles.

These and further novel features and objects of this invention have been accomplished as will become apparent from the following detailed description, discussion and the appended claims taken in conjunction with the accompanying drawing showing a preferred structure and embodiment, in which:

FIGURE 1 is an elevational view of a printing telegraph tape handling mechanism utilizing this invention and illustrates the mechanism in a stopped or idle condition omitting other machine components not directly associated with the tape; and

FIGURES 2, 3 and 4 are views similar to FIGURE 1, illustrating progressive stages in the operation of one complete cycle of tape pulling and feed sprocket advance.

The drawing figures schematically illustrate a machine work station, tape supply and the means for pulling the tape from the supply and advancing it through the station. At the right hand side of FIGURE 1 a large tape supply roll 10 is mounted to turn on spindle 12, resistance to free turning being provided by a roller 13 carried at the end of an arm 14 and biased against the tape roll 10 by a spring 15.

A strip of tape 16 leads from the roll 10 and eventually reaches a work station 18. The work station 18 includes a guide roller 20, a tape punching mechanism 22, and a feed sprocket 24 fixed on a rotatably journaled shaft 25. A ratchet wheel 26 is also fixed on shaft 25 and is arranged to be driven by a feed pawl 28. A detent such as leaf spring 30 engages the teeth of ratchet wheel 26 and prevents reverse turning of the feed sprocket 24.

Feed pawl 28 is biased into engagement against the teeth of ratchet wheel 26 by a spring 32 and is rotatably carried by a pin 34 on one arm 36 of a feed pawl support lever 38 which in turn is pivoted on a fixed post 40. The opposite arm of pawl support lever 38 ends in a cam follower 42 and the lever 38 is resiliently biased to press cam follower end 42 against the periphery of a rotatable cam 44 by a spring 46 having one end attached to the machine frame. Cam 44 is continuously driven clockwise by a shaft 47 connected to a suitable power source (not shown). In FIGURE 1, a lobe 48 of cam 44 has just passed the pawl actuating cam follower 42 which is now pressed against the low portion of the cam surface, and the feed pawl 28 is biased against the ratchet wheel 26 behind a ratchet tooth.

Disposed above the mechanism just described and pivotally mounted on a post 50 in the machine frame is a lever 52 which has two opposed arms 54 and 56 and a depending central member 58. Arm 54 of lever 52 has its end formed as a cam follower 62 which rides the periphery of previously described cam 44. A spring 64

biases the lever 52 counterclockwise to press the cam follower 62 against cam 44. The right hand arm 56 has downwardly inclined end portion 66 in which is inserted a post 68 to project forward toward the viewer normal to the plane of the lever 52. Post 68 extends across the full width of tape strip 16 and will thus be at least equal in length to the width of the tape strip 16.

At the bottom of the depending member 58 on lever 52, a spring tongue 72 is secured as by the screw 73 and projects to the right toward the end post 68. A geometric extension of the spring tongue falls slightly below the post 68 for a purpose which will presently become apparent.

Directly under the right hand end of spring tongue 72 a post 74, fixed in the machine frame, projects forward parallel to the post 68 and substantially across the tape strip 16. Tape strip 16 passes under the movable post 68 and over the fixed post 74. Both of posts 68 and 74 are cylindrical and provide smooth surfaces for the tape strip 16 to slide over.

Operation

When the machine is ready for operation the strip of tape 16 passes from supply roll 10 under the lever carried post 68, over the fixed post 74, under guide roller 20, through the tape punching mechanism 22 and over the feed sprocket 24. During operation, the cam 44 rotates one revolution per operation cycle and its lobe 48 raises the cam follower 62 on lever 52 as shown in FIGURE 2. As the cam follower 62 is raised, the righthand end of the spring tongue 72 is lowered to immediately engage and pinch the tape strip 16 against the fixed post 74. Further raising of the cam follower 62 causes further movement of lever 52 and post 68 presses down on the strip of tape 16 between roll 10 and fixed post 74. The tape strip 16 is prevented from moving in either direction at the post 74 due to the immediate clamping action of spring tongue 72, so additional tape can only come from the supply roll 10 as the lever carried post 68 presses the tape downward. The tongue 72 flexes upward, as shown in FIGURE 2, during continued lowering of post 68 and the angle formed in the tape at post 68 is diminished.

Cam 44 continues to rotate and the lever follower 62 is returned to the lower periphery of the cam surface causing the righthand arm 56 of lever 52 to raise. Spring tongue 72 will release its grip on the tape strip 16 at post 74. A slack loop 76 is now present in the tape strip 16, as shown in FIGURE 3. The amount of slack is determined by the length of lever arm 56 and the angular movement of the lever due to the rise of cam lobe 48.

Any work to be done on the tape strip 16, such as perforating by the punching mechanism 22, may be performed during the above described progressive stages and working can be continued until the tape is set in motion through the work station 18 as a result of the following operational sequence: As cam 44 continues its rotation, the lobe 48 eventually engages the feed pawl lever follower 42 and moves it to the left, as shown in FIGURE 4. Feed pawl 28 is pushed to the right to turn the ratchet wheel 26 one tooth space where the ratchet wheel is held by detent spring 30. The tape strip 16 is moved to the left through its engagement with the feed sprocket 24 and slack 76 in the tape strip 16, which was provided as explained above, will be taken up. The feed pawl lever follower 42 then drops off the cam lobe 48 and the machine is ready to begin another cycle. If the slack 76 is sufficient for two or more work cycles, lever 52 need be operated once for every two or more work cycles.

It is to be understood that the tape feeding mechanism at the work station can have one of any number of forms and it need not be operated by the same cam that operates the tape pulling device, the subject of this invention. In

lieu of the sprocket 24, for example a rubber wheel could be used to pull the tape strip by friction rather than by direct engagement of perforations. Use of this tape pulling mechanism will substantially eliminate slippage at a friction type feed wheel, rather than the prevention of tearing the tape strip as in a sprocket feed. As stated above it is not necessary that the feed at the work station be operated by the same cam which operates the tape puller, it is only necessary that the two feeds are synchronized so that the work station feed operates after the puller is restored to start position.

If it is desired to feed the tape strip through the work station continuously rather than intermittently, the guide roller 20 would be shiftably supported and held on the top of the tape strip 16 by light pressure of a spring device such as schematically indicated by spring 78. The operation would differ from that described above only in that during the period when tape strip 16 is clamped against the post 74, FIGURE 2, while the loop or slack 76 is being formed, the guide roller 20, which stores slack tape under a light pressure, will rise against the light bias of spring 78 and the angle in the tape strip 16 at the roller 20 will become greater. With this innovation the continuous feed mechanism would be pulling only against the spring 78 rather than against the mass of the supply roll 10.

It will be apparent that this mechanism for pulling a tape from a supply source may be used in apparatus other than telegraph machines, for example, motion picture projectors and the like.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A device for pulling a strip of material from a supply of strip material comprising: intermittently operative means, including strip gripping means and strip displacing means, for simultaneously gripping and rendering immobile a portion of the strip of material at a location remote from the supply and engaging another portion of the strip of material between the remote location and the supply to displace the strip of material away from its normal path into a path of greater length between the remote location and the supply to cause additional strip material to be pulled from the supply; said gripper means during gripping operation being adapted to engage opposite surfaces of the strip to thereby create a clamping force on the strip.

2. A device for pulling a strip of material from a supply of strip material comprising: a strip guide member fixed on a machine frame and disposed adjacent the path of the material strip; a pivotally mounted lever on the machine frame adapted to be swung through a predetermined pivotal angle; a member on said lever adapted to grip the material strip against said strip guide member immediately following initiation of lever pivotal movement from one of its limit positions and through the remainder of the angle of lever pivotal movement; and a material strip engaging member on said lever for engaging the material strip between said guide member and the strip material supply and upon lever pivotal movement in one direction to deflect the material strip and pull an additional quantity of material from the supply; and means for moving said lever between its limits of pivotal movement.

3. A device for pulling a strip of material as defined in claim 2 wherein said strip guide member is an elongate

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member over which said strip passes after being pulled from the supply; and said member on said lever adapted to grip the material strip is a resilient device adapted to be moved, upon lever pivotal movement, to engage the material strip and resiliently grip the strip against said elongate member.

4. A material strip handling machine comprising: a work station including strip advancing means; a material strip supply roll remote from said work station; a strip guide means between said work station and said supply roll; said strip material leading from said supply roll, guided across said guide means and through the work station strip advancing means; a first means for engaging and releasably clamping the strip material at a position on the strip of material located against the guide means; a second means for engaging the strip material at a position on the strip of material located between said guide means and said supply roll and forcing the strip material out of its normal path into a path of greater length to thereby draw additional strip material from said supply roll; and means for synchronously operating said first means and said second means whereby said strip material is intermittently clamped and simultaneously pulled, after which the first and second means are moved to free the strip material and permit it to be advanced through said work station by said strip advancing means.

5. For use in combination with a printing telegraph machine: a roll of tape; a tape perforation work station; a tape advancing means at said work station coacting with tape from said roll; and intermittently shiftable means disposed between said tape advancing means and said roll of tape including first means, which upon shifting movement of said shiftable means will engage and grip opposite surfaces of a portion of the tape between the tape advancing means and said roll of tape and second means which, simultaneous with said shifting movement, engages another portion of the tape between the gripped portion of tape and the roll of tape to force the tape away from its normal path into a path of greater length between the gripped portion and said roll of tape to pull additional tape from said roll.

6. A material strip handling machine comprising: a work station including strip advancing means; a material strip supply roll remote from said work station; a strip guide means between said work station and said supply roll; said strip material leading from said supply roll, guided across said guide means and through the work station strip advancing means; a pivotally mounted lever; a first means including a resilient member carried by said lever for engaging and releasably gripping the strip material against said guide means upon movement of said lever; a second means carried by said lever for engaging the strip material between said guide means and said supply roll, the resilience of said resilient member permitting further lever movement so said second means can move said strip out of its normal path, while the strip is being gripped, into the path of greater length to thereby draw additional strip material from said supply roll; and means for synchronously operating said first means and said second means whereby said strip material is intermittently clamped and simultaneously pulled, after which the first and second means are moved to free the strip material and permit it to be advanced through said work station by said strip advancing means.

7. A material strip handling machine comprising: a work station including strip advancing means; a material strip supply roll remote from said work station; a strip guide means between said work station and said supply roll; said strip material leading from said supply roll, guided across said guide means and through the work station strip advancing means; a first means for engaging and releasably clamping the strip material against the guide means; a second means for engaging the strip material between said guide means and said supply roll and

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forcing the strip material out of its normal path into a path of greater length to thereby draw additional strip material from said supply roll; means for synchronously operating said first means and said second means whereby said strip material is intermittently clamped and simultaneously pulled, after which the first and second means are moved to free the strip material and permit it to be advanced through said work station by said strip advancing means; and common power means operatively associated with said first and second means and said strip advancing means to cause intermittent operation of said strip advancing means, said intermittent operation occurring only during periods when said first and second means are moved to free the strip material.

8. A machine as defined in claim 7 wherein said common power means includes a rotatable shaft with cam means fixed thereto; said strip advancing means includes a cam follower actuating member coacting with said cam means for cyclic operation; and a common member carries said first and second means and includes a cam follower actuating member coacting with said cam means for cyclic operation.

9. For use in combination with a printing telegraph machine: a roll of tape; a tape perforation work station; a tape advancing means at said work station coacting with tape from said roll; intermittently shiftable means disposed between said tape advancing means and said roll of tape including first means which, upon shifting movement of said shiftable means, will engage and grip opposite surfaces of a portion of the tape between the tape advancing means and said roll of tape and second means which, simultaneous with said shifting movement, engages another portion of the tape between the gripped portion of tape and the roll of tape to force the tape away from its normal path into a path of greater length between the gripped portion and said roll of tape to pull additional tape from said roll; and a biasing guide means, disposed between the position of gripping by said shiftable means and said work station, engaging and variably displacing said tape with a light bias force to create a working portion of tape, ahead of said work station, maintained taut under said light force.

10. A strip pulling apparatus for use in combination with a supply of strip material having a portion of the strip material leading from the supply to and through a strip advancing mechanism comprising: a first means adapted to be actuated to engage opposite surfaces of the portion of strip material to clamp and maintain a portion of strip material immobile and against movement toward the supply; and second means intermittently movable and operable during said clamping function of said first means to engage and move the portion of the strip material at a location on the portion of strip material situated between the first means and said supply and between the strip advancing means and said supply, transverse of its normal path whereby additional strip material is pulled from said supply to provide a slack portion of strip material between the supply and the strip advancing mechanism.

11. For use in combination with apparatus having a supply roll of strip material with a strip of the material leading through a work station which includes a means for advancing the strip past the work station, a strip material puller to provide slack in the strip of material between the supply roll and the work station comprising: a gripper device adapted to engage opposed surfaces of the strip of material to grip the strip of material leading from the supply roll through the work station and prevent movement of the gripped portion of the strip of material in a direction back toward the supply roll; a shiftable device having means dimensioned substantially equal to the width of the strip of material movable, upon shifting, to engage the strip of material across its width at a location which is between said gripped portion of the strip of material and the supply roll and is also between the

work station and the supply roll and move the strip of material to divert the path of the strip of material an extent causing additional strip material to be pulled from the supply roll; and means connected to said gripper device and said shiftable device to synchronously operate said gripper and said shiftable device so said gripper is operative at least during the period in which said shiftable device is operative.

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References Cited in the file of this patent

UNITED STATES PATENTS

1,969,692	Dirkes	Aug. 7, 1934
1,972,902	Potdevin	Sept. 11, 1934
1,972,903	Potdevin	Sept. 11, 1934
2,160,530	Newman	May 30, 1939
2,721,077	Russell et al.	Oct. 18, 1955