United States Patent [19]

Hawkins

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[45] **Aug. 5, 1975**

[54] **APPARATUS FOR FORMING AND SECURING A TAB**

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[21] Appl. No.: **400,065**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 232,168, March 6, 1972, abandoned.

[52] **U.S. Cl.** **156/510;** 83/226; 242/56.8

[51] **Int. Cl.**..... **B32b 31/00;** B65h 35/02

[58] **Field of Search** 156/510, 517, 518, 519, 156/520, 252, 261, 262; 83/226, 229; 242/56.8

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Primary Examiner—Douglas J. Drummond
Attorney, Agent, or Firm—George F. Smyth

[57] **ABSTRACT**

An apparatus for cutting a tab which employs a reciprocable punch and a die having an opening in alignment with the movement of the punch and positioned a spaced distance from the punch. A tab supply tape is fed through an opening defined by the spaced distance between the punch and die and, on reciprocation of the punch into contact with the die opening, a tab is cut from the tape.

The line of direction of the reciprocatory movement of the punch may be determined by guide means which slidably receive the punch with the punch being pivotally connected to a reciprocable actuator. The connection between the punch and actuator permits pivotal movement of the actuator with respect to the punch while maintaining the alignment of the punch.

Adjustable means may interconnect the movement of the punch and movement of the tape such that the distance of movement of the tape is adjustably related to each reciprocation of the punch. Also, means may be provided which control the speed of movement of the tape in relation to the tension in the tape. In addition, centering means may be provided to maintain the position of the long dimension of the tape relatively constant with respect to the position of the punch and the position of the opening in the die. In the movement of the tape through the spaced distance separating the punch from the die, the tape movement is maintained at approximately a right angle to the direction of movement of the punch. Further, the die and punch may have curved lower surfaces.

A method for applying a tab to preselected portions of an audio or visual tape in which the tape is held in a curved configuration over a reel having projections which engage holes positioned along a side of the tape. A shoe having a curved surface, a central opening and a depression in the curved surface is aligned with the tape along the axis of the holes in the tape by bringing the curved surface of the shoe into contact with the tape reel with a depression in the bottom curved surface of the shoe in alignment with a projection on the reel. Following this, a tab having a gummy surface is adhered to a preselected portion of the tape by pushing the tab through the central opening of the shoe to bring the gummy surface of the tab into contact with the audio or visual tape. A pushing member having a curved pushing face may be used to push the tab through the opening to provide the tab with a curved configuration prior to its contact with the curved configuration of the audio or visual tape.

10 Claims, 12 Drawing Figures

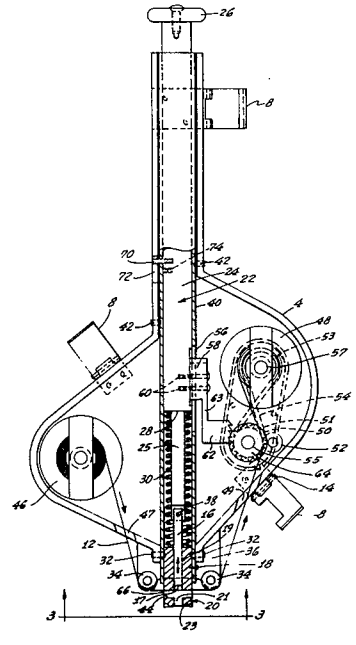


Fig. 1

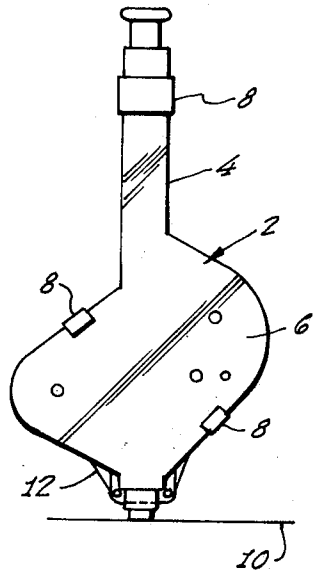


Fig. 2 (Cover Off)

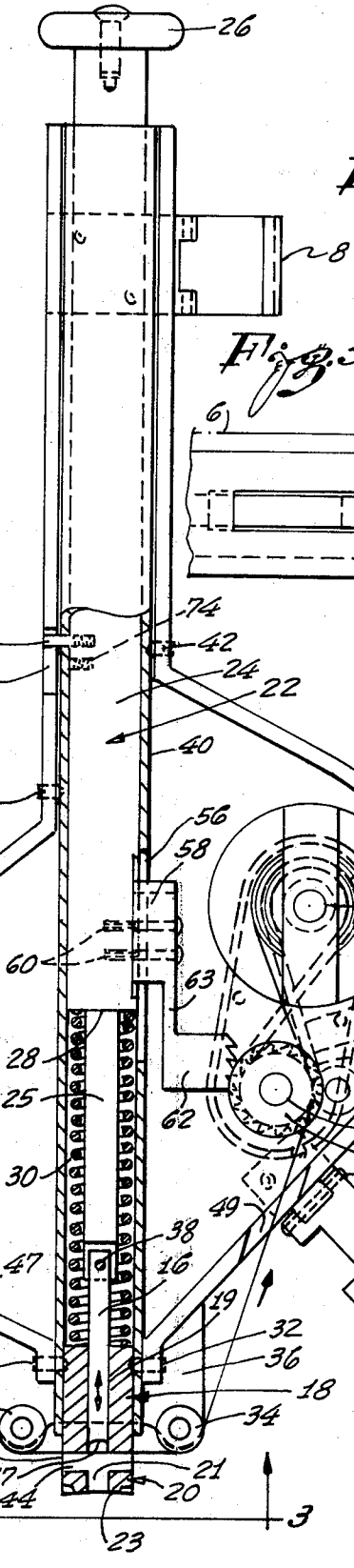


Fig. 3

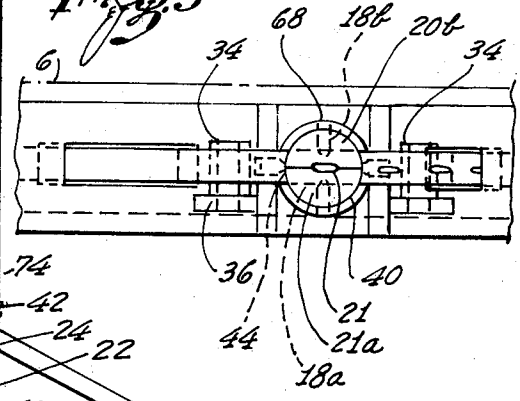


Fig. 4

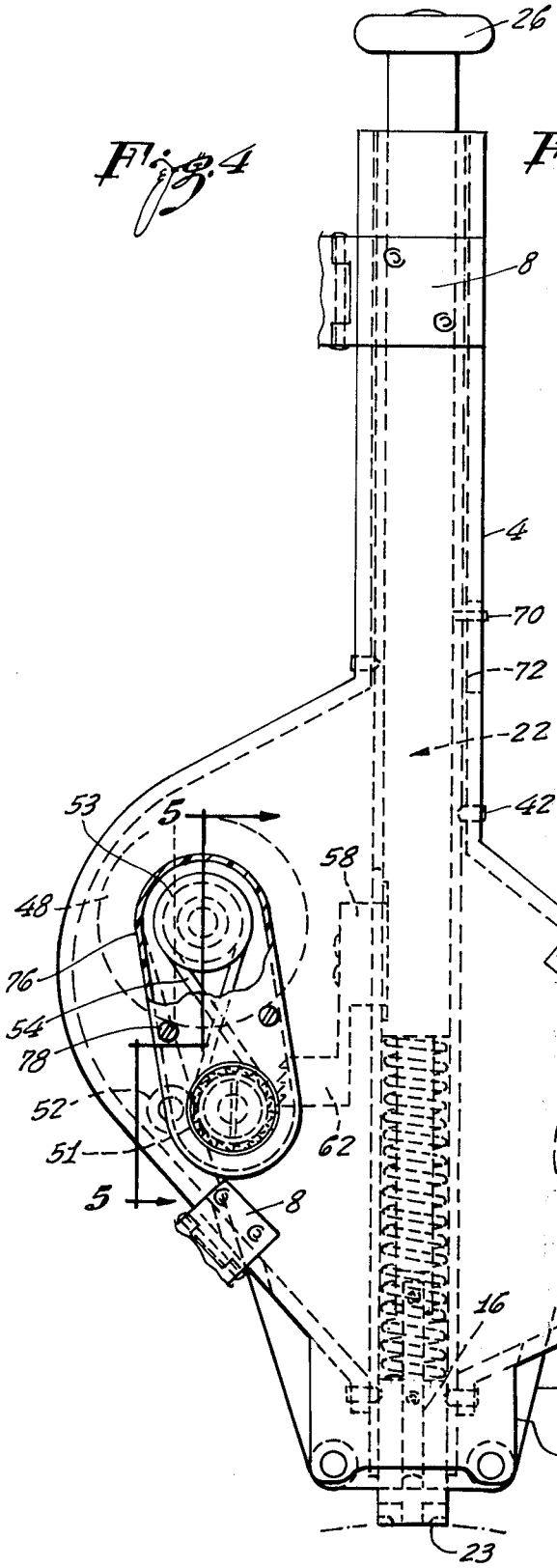
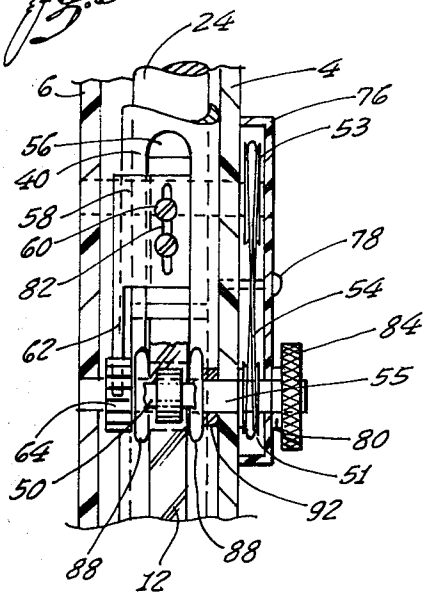

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Fig. 5


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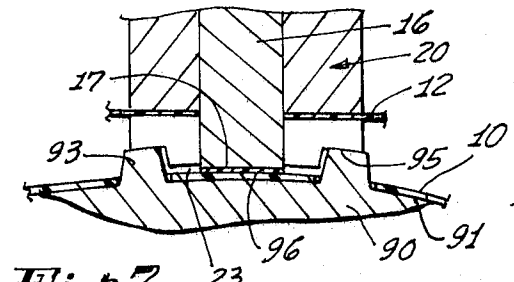


Fig. 7

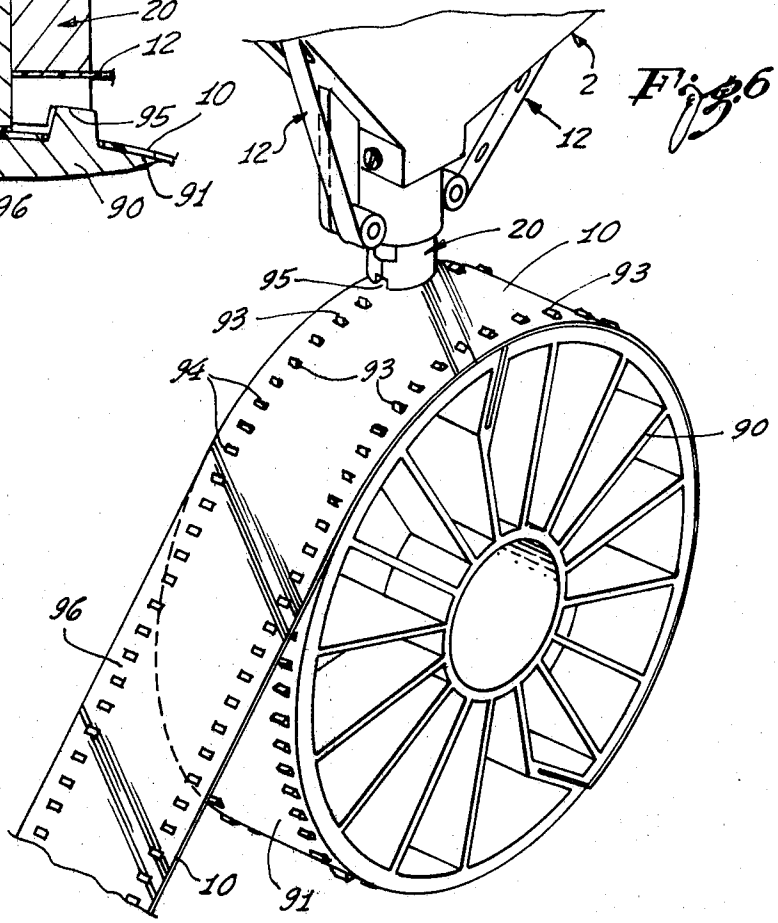


Fig. 6

Fig. 8

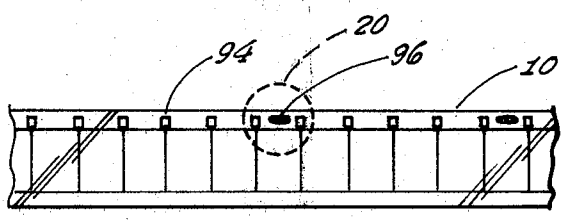


Fig. 9

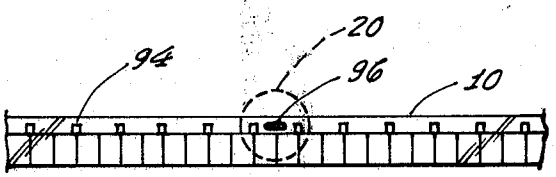


FIG. 10.

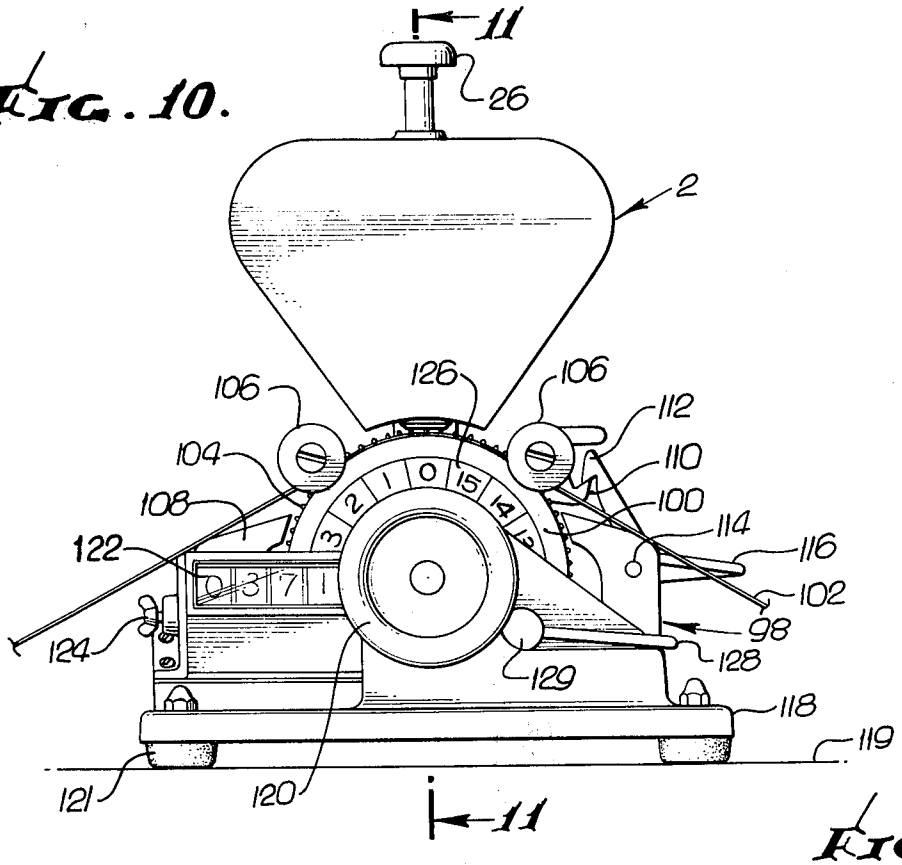


FIG. 12.

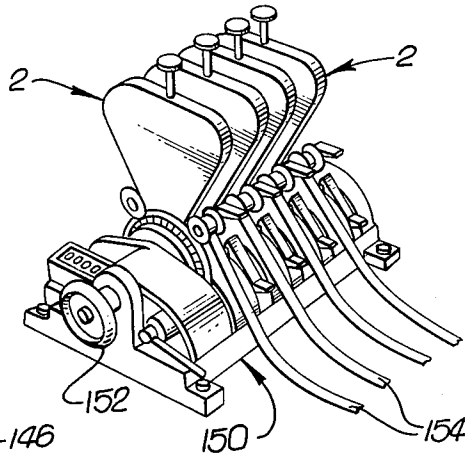
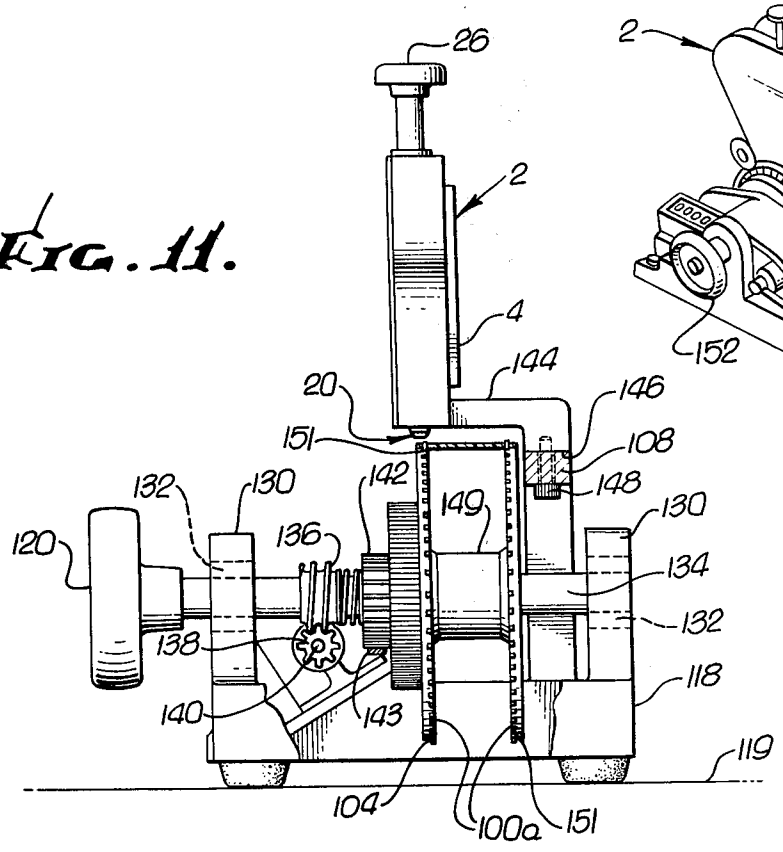


FIG. 11.



APPARATUS FOR FORMING AND SECURING A TAB

PRIOR APPLICATIONS

This application is a continuation-in-part of my prior copending U.S. application Ser. No. 232,168, filed Mar. 6, 1972 now abandoned.

BACKGROUND OF THE INVENTION

In the use of an audio or visual tape, it is frequently desirable to place a tab on the tape. This may be done, for example, with an audio tape to indicate that the tape is about to become unwound from a feed reel. The tab, in this case, may be a metallic tab to provide electrical continuity between a pair of electrodes to provide a signal to reverse the direction of movement of the tape.

In the use of visual tapes, i.e., films, in producing a television commercial, the commercial is shot under proper lighting conditions to properly expose a master negative. A working negative is then made from the master and the working negative is used to form the positive which will be projected during the telecasting of the commercial. For many reasons, it may be desirable to change the lighting of the various scenes carried by the positive.

To accomplish this, a metallic tab may be applied to a preselected location on the edge of the film to signal a change in the lighting employed for developing a particular scene on the positive film strip. The light intensity is then varied automatically through an electronic circuit on receipt of the signal.

While various devices are disclosed in prior patents for cutting tabs from a tape, there has not been, to my knowledge, any such device for cutting and applying a tab to an audio or visual tape. The practice previously employed in placing tabs on visual tapes or films has required the use of tweezers to position precut tabs on the film. The precut tabs were defined by perforations in a large sheet of an adhesive coated foil. In use, the precut tabs were individually removed from the sheet and applied manually to the desired location on the film. Due to their small size and their adhesive surface, the tabs have been difficult to work with and the operation has been quite time consuming.

The various types of prior art apparatus for cutting a tab from a tape have not been suitable for use in forming a tab and then bringing it into contact with a predetermined portion of an audio or visual tape. The placement of a tab on an audio or visual tape is quite critical since it is the position of the tab which determines the time that a signal is generated which determines how the tape is used in producing an audio or visual effect. At present, there is, thus, a need for an apparatus which has the capability of both forming a tab and precisely positioning the tab at a predetermined location on an audio or visual tape.

SUMMARY OF THE INVENTION

The present apparatus is uniquely capable of cutting a tab and then positioning the tab precisely at a predetermined location on an audio or visual tape. Further, the present method positions a tab at a predetermined location on a visual or audio tape without requiring the manual positioning of the tab with respect to the tape.

The present apparatus employs a reciprocable punch and a die having an opening which is aligned with the punch. With the die positioned a spaced distance from the punch, a tab supply tape is moved between the punch and the die. On movement of the punch into the opening in the die, a tab is cut from the tab supply tape and pushed through the opening.

In order to maintain the alignment of the punch such that its reciprocable path is fixed, the punch may be contained within guide means having an opening which slidably receives the punch. A reciprocable actuator is pivotally connected to the punch. With the pivotal connection between the punch and the actuator, misalignment of the actuator does not cause misalignment of the punch whose path of movement is determined by the guide means. This provides a precise alignment of the punch, which, in turn, permits precise cutting and placement of the tab with respect to an audio or visual tape.

Adjustable means may interconnect the movement of the punch and the movement of the tape such that the distance of the tape movement is adjustably related to each reciprocation of the punch. Through the adjustable means, the distance of tape movement may be either increased or decreased with respect to each reciprocation of the punch. Tab supply means may also be provided to control the speed of movement of the tape with respect to the tension in the tape. Thus, as the tape is wound about a takeup reel, the linear movement of the tape is directly related to the tension of the tape irrespective of the effective diameter of the takeup reel as determined by the thickness of the tape layer on the reel.

Also, centering means may be provided to maintain the position of the long dimension of the tape with respect to the position of the punch and the die opening. Thus, as the punch passes through the tape in forming a tab, the tab is cut from the center portion of the tape without severing the tape through severing of its side edges.

In order to align my apparatus with the surface of an audio or visual tape in applying a tab, both the lower surface of the die and the pushing surface of the punch may have correspondingly curved surfaces. This permits the lower surface of the die to be brought into contact with the curved surface of the audio or visual tape, for example, as it passes over a reel. The correspondingly curved surface of the punch gives the tab a curvature prior to its engagement with the curved surface of the audio or visual tape which assists in bonding the tab to the audio or visual tape.

A further aspect of the invention comprises a tab-cutting and applying mechanism in combination with a sync-block. The tab-cutting and applying mechanism is positioned on the sync-block with the lower die surface and the pushing surface of the punch having a curvature which corresponds with the curvature of the reel of the sync-block. Further, the size and positioning of the punch is such that the punch passes between projections on the reel of the sync-block which engage openings positioned along the side surface of the tape. As the reel of the sync-block is rotated, the engagement of the projections on the reel with the openings in the film causes movement of the film to a desired location for affixment of a tab. The reel of the sync-block may be keyed to a counting indicator which indicates the frame of the film that is positioned beneath the punch of the tab-cutting and applying mechanism. This per-

mits the precise placement of the tabs at desired locations on the film strip.

In a further embodiment of the invention, a plurality of tab-cutting and applying mechanisms are positioned with respect to a plurality of reels carried by a rotatable shaft of a sync-block. As the shaft is rotated, a plurality of film strips are moved through the sync-block by engagement of the film strips with their respective reels. As the film strips are, thus, positioned by the sync-block tabs are cut and applied at precise locations on the several film strips by the tab-cutting and applying mechanism.

In accord with the method of the invention, an audio or visual tape may be held in a curved configuration by a reel. A shoe having a curved surface and a central opening is placed in contact with the curved tape. Following this, a tab having a gummy surface is applied to a preselected portion of the tape by pushing the tab through the central opening in the shoe to bring the gummy surface into contact with the tape. The pushing member used in pushing the tab through the opening in the shoe may have a curved pushing surface. Thus, as the tab is pushed through the opening in the shoe, it is curved by the pushing surface such that its gummy surface more readily conforms to the curvature of the audio or visual tape.

In the performance of the method, the tab may be cut by moving a tab supplying tape between a punch and die which are positioned in an aligned relation with the opening in the curved shoe. The punch is then moved toward the die to cut a tab from the tab supplying tape and continued movement of the punch forces the tab through the opening in the shoe. The pushing face of the punch may have a curved surface which imparts a curvature to the tab prior to its contact with the tape to assist in its application to the curved surface of the audio or visual tape.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which are to be regarded as merely illustrative:

FIG. 1 is a front elevation of a preferred embodiment of my apparatus with the front covr plate in place;

FIG. 2 is an enlarged front elevation of the apparatus, partially in section, with the front cover plate removed;

FIG. 3 is a bottom view of the apparatus taken along the line 3—3 of FIG. 2;

FIG. 4 is a back view of the apparatus with the cover for the belt housing partially broken away;

FIG. 5 is a side sectional view through the belt housing along the line 5—5 of FIG. 4;

FIG. 6 is a perspective view of the apparatus in operation in placing tabs on a film strip passing over a film reel;

FIG. 7 is an enlarged central sectional view of the die and plunger during application of a tab to a visual tape supported on a reel;

FIG. 8 is a top view of a portion of a 16mm film strip having tabs adhered thereto;

FIG. 9 is a top view of a portion of an 8mm film strip having a tab adhered thereto;

FIG. 10 is a front view of a tab-cutting and applying mechanism in combination with a sync-block;

FIG. 11 is a side view, partially in section, taken along the line 11—11 of FIG. 10 to illustrate certain structural details of the sync-block and the manner in which movement of the reel of the sync-block may be transmitted to a counter, and

FIG. 12 is a perspective view illustrating a plurality of tab-cutting and applying mechanisms in combination with a sync-block having a plurality of reels.

DETAILED DESCRIPTION OF THE DRAWINGS

In the front elevational view of my tab forming apparatus shown in FIG. 1, the apparatus 2 includes a housing 4 and a front cover 6 which is held in place by clamps 8. In usage, tabs are cut from a tab supply tape 12 and adhered to the surface of an audio or visual tape 10.

Turning to FIG. 2, each of the clamps 8 conveniently includes a hinge 14 to permit hinged movement of one portion of the clamp with respect to a fixed portion of the clamp which is connected in any suitable manner to the back surface of the housing 4. A reciprocable plunger 16 having a curved lower surface 17 is contained within a plunger guide or guide means 18. The plunger guide 18 includes a central opening 19 in slidable engagement with the plunger 16 so as to restrict its path of movement to the axis of the opening 19. A die 20 having a die opening 21 is positioned in aligned relation with the opening 19. The lower surface of the die 20 has a curved surface or shoe 23 for reasons which will be described subsequently.

An actuator 22 having an enlarged portion 24 and a narrowed portion 25 is pivotally connected to plunger 16 through a pivot 38. The pivot 38 permits pivotal movement of the narrowed actuator portion 25 with respect to the plunger 16 and, thereby, assists in maintaining the fixed movement of the plunger determined by the axis of the opening 19 in the plunger guide 18. The actuator 22 terminates upwardly in a head 26 having a shape that may be conveniently grasped by the hand in moving of the actuator.

The lower surface of the enlarged actuator portion 24 defines a shoulder 28 which bears against a coil spring 30. The coil spring 30 is retained at its lower end by the upper surface of the plunger guide 18 so as to bias the actuator 22 to an upward position as illustrated in FIG. 2. The plunger guide 18 is fixedly held with respect to the housing 4 by lock screws 32 which threadedly engage openings in the housing 4 and bear at their inner ends against the outer peripheral surface of the plunger guide 18.

A pair of rollers 34 are rotatably mounted on a frame 36 which is fixed to the housing 4. As illustrated, the lower surfaces of the rollers 34 lie in a plane which is closely adjacent to the bottom surface of the plunger guide 18. The tab supply tape 12 passes over the rollers 34 and through a slot 44 between the die 20 and the plunger guide 18.

The actuator 22 is slidably positioned within a sleeve 40 which is fixedly mounted with respect to the housing 4 by lock screws 42 in threaded engagement with the openings in the housing and bearing at their inner ends against the sleeve 40. A slot 72 passing through the housing 4 and the sleeve 40 exposes the outer surface of the enlarged actuator portion 24. A pin stop 70 within the slot 72 threadedly engages one of several threaded holes 74 in the enlarged actuator portion 24. The position of the slot 72 is fixed while the actuator 22 undergoes reciprocatory movement and the pin 70, thus, moves back and forth within the slot 72. The position of the pin stop 70 with respect to the extremities

of the slot 72 determines the degree of movement experienced by the actuator 22 and plunger 16 during one reciprocation and the degree of movement may be varied by varying the position of the pin stop 70 relative to the slot 72. This is accomplished by moving the pin stop 70 to another of the several threaded holes 74 in the actuator 22.

The tab supply tape 12 is fed from a supply reel 46 through a slot 47 in the housing 4. The tape then passes over the pair of rollers 34, as described, and back into the housing 4 through a slot 49. After passing through slot 49, the tape passes between a friction reel 50 and an idler roller 52 and then around a takeup reel 48. As the reel 46 rotates in a clockwise direction, as shown in FIG. 2, the tape 12 is unwound from the reel with its gummy side facing downwardly away from the rollers 34. After passing through the slot 44, the tape encounters the friction reel 50 which rotates in a counterclockwise direction and then over the takeup reel 48 rotating in a clockwise direction. By virtue of this arrangement, the gummy side of the tape 12 is positioned inwardly against the reel, both during unwinding from the supply reel 46 and during takeup on the takeup reel 48.

The friction reel 50 is mounted on a rotatable shaft 55 in axial alignment with a lower pulley 51 and a pinion gear 64 which are also mounted on the shaft. A belt 54 passes about the lower pulley 51 and over an upper pulley 53 which is coaxially mounted with the takeup reel 48 on a rotatable shaft 57. The rotatable movement of the friction reel 50 is transmitted to the takeup reel 48 which rotates in an opposite direction to that of the friction reel 50 due to the crossed configuration of the belt 54.

The friction reel 50 and takeup reel 48 are driven through pinion gear 64 which engages the teeth of a rack 62. As illustrated, the rack 62 is connected to the actuator 22 through an attachment bracket 58 that is adjustably mounted on actuator 22 by bolts 60 which threadedly engage holes in the enlarged portion 24 of the actuator. The attachment bracket 58 passes through a drive slot 56 in the sidewall of the sleeve 40. Connecting the rack 62 to the attachment bracket 58 is a flexible arm 63. The teeth of the rack 62 and the teeth of the pinion gear 64 are shaped to permit relative sliding movement as the rack is moved in an upward direction from that shown in FIG. 2. As this occurs, the rack does not impart rotational movement to the pinion gear 64 and the rack 62 is bent away from the pinion gear 64 through flexing of the arm 63. However, during downward movement of the rack 62, transverse portions of the teeth of the rack 62 are presented to corresponding transverse portions of the teeth of the pinion gear 64. This causes counterclockwise rotation of the pinion gear 64 during downward movement of the rack 62 from its position as shown in FIG. 2.

By moving the attachment bracket 58 relative to the actuator 22 in either an up or down direction from that shown in FIG. 2, the number of teeth on the rack 62 which engage the teeth on the pinion gear 64 during downward movement of the rack 62 can be varied. This, in turn, causes a corresponding variation in the degree of rotational movement experienced by the pinion gear 64 during downward movement of the rack 62 and permits adjusting the degree of movement experienced by tab supply tape 12 during one reciprocation of the actuator 22 and plunger 16.

Turning to FIG. 3, which is a bottom view of the apparatus along line 3—3 of FIG. 2, the die 20 is formed in two halves, 20*a* and 20*b*. The die 20 and plunger guide 18, as illustrated in FIGS. 2 and 3, are integral and the two die halves 20*a* and 20*b* are each connected to a corresponding half, 18*a* or 18*b*, of the plunger guide 18. The guide halves 18a and 18*b* are in line with and shielded by the corresponding die halves, 20*a* and 20*b* in FIG. 3. Thus, numerals 18*a* and 20*a* appear to denote the same part in FIG. 3 while numerals 18*b* and 20*b* likewise appear to denote the same part. The slot 44, as illustrated in FIG. 3, is a cutout portion defining narrowed connecting walls 66 (FIG. 2) between each of the die halves and its corresponding plunger guide half. The unitary structure composed of the two die halves 20*a* and 20*b*, each interconnected to their corresponding plunger guide halves 18*a* and 18*b*, is held by the surrounding sleeve 40. Lock screws 68 threadedly engage holes in the sleeve 40 and in the respective die and guide halves 18*a*, 20*a*, and 18*b*, 20*b* to hold the halves in a unitary fixed relation.

FIG. 4, which is an enlarged back view in partial section of the apparatus of FIG. 1, illustrates further details of the drive mechanism of the takeup reel 48. As illustrated, a rearwardly extending belt housing 76 encloses the upper pulley 53, the lower pulley 51, and the belt 54. The housing 76 is removably secured by screws 78 to the housing 4 to permit easy access to the pulleys and belt.

Turning to FIG. 5, which is a sectional view along the line 5—5 of FIG. 4, the rotatable shaft 55 is rotatably held by engagement with openings in the housing 4 and in the front cover 6. A stub bearing 92 secured to the housing 4 permits easy rotation of the shaft 55. A pair of centering shoulders 88 on the friction reel 50 centers the tab supply tape 12 as it passes over the reel 50. This serves to maintain the long dimension of the tape in a fixed position that is relatively constant with respect to the movement of the plunger 16 and the position of the die opening 21. A longitudinal slot 82 in the attachment bracket 58 permits upward or downward movement of the bracket with respect to the enlarged actuator portion 24 by loosening of the bolts 60. In this manner, the stroke of the rack 62 and the number of the teeth of the rack which engage corresponding teeth of the pinion gear 64 can be varied. This, in turn, causes a variation in the distance which the tab supply tape 12 advances during one reciprocation of the actuator 22 and piston 16.

The rotatable shaft 55 extends through a hole in the outer wall in the belt housing 76 and is there connected to a control knob 84 having a spacer 80 positioned between it and the rear surface of the belt housing 76. By manually turning the knob 84, the shaft 55 is rotated during threading of the tab supply tape 12 between the friction reel 50 and idler roller 52 onto the takeup reel 48.

The functioning of the apparatus is illustrated in FIG. 6 in which an audio or visual tape 10 is pulled over a reel 90 in a curved path. With the reel 90 held stationary, the apparatus 2 is positioned relative to the outer surface 91 of the film reel by bringing the curved surface 23 defining a shoe on the bottom surface of the die 20 into contact with the outer surface of the visual tape 10. Projections 93 on the outer surface 91 of the reel 90 engage openings 94 positioned along the side surface of the visual tape 10. The projections 93 are

aligned with depressions 95 in the curved bottom surface 23 of the die 20. Due to the engagement of projections 93 with depressions 95 and the contact of the curved surface 23 with the tape 10, the apparatus is precisely aligned for placing a tab 96 on the surface of the film 10.

The position of the die 20 and plunger 16 during placement of a tab 96 is shown in FIG. 7. The lower surface 23 of die 20 is in contact with the surface of film 10 and the curved lower surface 17 of the plunger 16 is in alignment with surface 23. The stroke of plunger 16 is adjusted so that the surface 17 does not strike the surface of the visual tape 10 with a force sufficient to damage it. If desired, springs (not shown) may be provided to permit relative yieldable movement between the plunger 16 and actuator 22 to prevent tape damage if there is contact of the surface 17 with the visual tape 10.

During the tab placement, a pair of adjacent projections 93 are in engagement with a pair of depressions 95 in the surface 23 defining the shoe. This engagement, in addition to the contact of curved surface 23 with the tape 10, aligns the apparatus 2 with the tape to permit precise placement of the tab 96.

As shown in FIG. 8, a tab 96 is placed on a 16mm film 10 between the holes 94. The die 20, shown in phantom, is positioned above the center line of the holes 94 such that the tab 96 is adherently bonded to the film 10 in line with the holes 94. Similarly, in FIG. 8, a tab 96 is shown in place on an 8mm film 10 on the center line of the holes 94 and spaced halfway between an adjacent pair of holes.

As the tab supply tape 12 is wound on the takeup reel 48, as shown in FIGS. 2 and 4, the effective diameter of the reel is increased due to the thickness of the tape wound on the reel. This, in turn, increases the distance that the supply tape 12 is advanced with each revolution of the reel 48. To prevent tape breakage due to increased tension applied through the increased effective diameter of the reel 48, the surfaces of the upper pulley 53 and the lower pulley 51 in contact with the belt 54 are coated with tetrafluoroethylene (sold by DuPont under the trademark Teflon). The belt 54 is fabricated of nylon. This combination of materials produces a coefficient of friction between the belt 54 and pulleys 51 and 53 which permits slippage of the belt relative to the pulleys in response to the tension in the tab supply tape 12. As a result, the speed or distance of movement of the tab supply tape 12 is controlled in relation to the tension of the tape. This invention is not restricted to the use of any particular combination of materials to control the coefficient of friction between the belt 54 and the pulleys 51 and 53 and the materials may be varied so long as the end result is controlled slippage of the belt in response to the tension in the tab supply tape 12.

In cutting and placing a tab 96 on the surface of an audio or visual tape 10, as described in regard to FIGS. 6–9, the tab forming apparatus 2 may be used in combination with a sync-block 98 as shown in FIG. 10. The sync-block 98 includes a reel 100 which is rotatably mounted for engagement with an audio or visual tape 102. Projections 104 on the reel 100 similar to the projections 93 described with regard to FIG. 6, engage apertures along the sides of the tape 102 such that rotation of the reel causes movement of the tape beneath the tab forming apparatus 2.

Guide rolls 106 may be utilized to engage the upper surface of the tape 102 to bring it into engagement with the reel 100. The guide rolls are carried by a pivotal yoke 108 which includes a hook 110. The yoke 108 may be pivoted upwardly to move the guide rolls 106 away from the reel 100 when placing a new tape 102 on the reel. A rotatable keeper 112 engages the hook 110 in maintaining the yoke 108 in its lowered position. The keeper 112, which is rotated about a pivot 114, may be biased to its position as shown in FIG. 10. However, by depressing a handle 116, the keeper 112 may be rotated in a clockwise direction to disengage the hook 110 and permit upward rotation of the yoke 108 in a counterclockwise direction.

The sync-block 98 may include a base member 118 which suports the synch-block on feet 121 with respect to a horizontal surface 119. A knob 120 is connected to the reel 100 such that rotation of the knob causes a corresponding rotation of the reel. A counter 122 secured to the sync-block 98 in any convenient manner, such as a wing nut 124, may be connected to the reel 100. Thus, each rotation of the reel 100 is recorded by the counter 122 in indicating the position of the tape 102 with respect to the tape forming apparatus 2.

A dial 126 formed on an outer face of the reel 100 may also be used to indicate reel movement in fractions of a revolution. As illustrated, the dial 126 is uniformly numbered from zero to fifteen, thereby indicating rotational movement of the dial 100 in increments of 1/16 of a revolution. In placing a tab on a visual tape, the markings on the dial 126 may correspond to the space occupied by one film frame. Thus, one complete revolution of the reel 100 would move sixteen frames of film beneath the tab cutting and application apparatus 2 and the number one would be indicated by the counter 122.

Assuming, for example, that a metallic tab is to be placed adjacent the 172th frame on a visual tape, the tape 102 would be placed on the reel with the first frame positioned beneath the apparatus 2 and the number zero on the dial 126 positioned upwardly as shown in FIG. 10. Then, the knob 120 is rotated in a clockwise direction until the number ten appears on the face of counter 122, indicating that 10 × 16 or 160 frames have been moved past the apparatus 2. The knob 120 is then moved in a clockwise direction until the number 11 appears in an upright position directly beneath the apparatus 2 indicating that the 12th frame in excess of 160 is then positioned beneath the apparatus. At this point, the head 26 is actuated downwardly as described previously with regard to FIGS. 1–9 to cut a tab from a tab supply tape 12 and to press the tab against the film surface with a reciprocable plunger 16 having a curved lower surface 17 conforming to the curvature of reel 100. As described in FIGS. 6–9, the position of the apparatus 2 with respect to the sync-block 98 and the reel 100 (FIG. 10) positions the plunger 16 between the projections 104 on the reel. The die 20 (FIG. 7) may have a lower surface 23 curved to conform to the curvature of the reel 100 with depressions corresponding to depressions 95 which engage the projections 104.

When the reel 100 is moved to position the tape 102 beneath the apparatus 2, the reel may be locked by movement of a pivotal lock lever 128 to the position shown in FIG. 10. As will be described, the movement of the lock lever 128 about a pivot 129 immobilizes the

reel **100** to fix the position of the tape **102** during placement of a tab on the tape.

Turning to FIG. **11**, which is a partial sectional view taken along line **11—11** of FIG. **10**, bearings **132** in stanchions **130** supported by the base member **118** support a shaft **134**. The knob **120** and reel **100** are mounted on shaft **134** such that rotation of the knob causes a corresponding rotation of the reel. A worm gear **136** formed on the shaft **134** engages a spur gear **138** affixed to a shaft **140** which actuates the counter **122**. Thus, each complete rotation of shaft **134** causes a complete rotation of the shaft **140** to record the rotation on the counter **122**.

A gear **142** is mounted on the shaft **134** and a detent **143** connected to the lock lever **128** engages the teeth of the gear when the shaft is in a locked position. With the lock lever **128** in its downward position shown in FIG. **10**, the detent **143** engages the teeth of the gear **142**. Rotation of the lock lever in a counterclockwise direction about pivot **129** moves the detent **43** out of engagement with the teeth of the gear **142**.

The reel **100** may be formed of two side members **100***a* which each carry projections **104** that engage side apertures in the tape **102**. The side members **100***a* are held in a spaced-apart relation by a hub **149** and the circumferential surfaces **151** on each of the side members **100***a* provide underlying support for the edges of the tape **102**.

The tab forming apparatus **2**, as described previously, is supported above the reel **100** for application of a tab adjacent the edge of the tape **102** with the tab being spaced between side apertures in the tape which receive the projections **104**. During application of the tab to the tape **102**, the underlying portion of the tape is supported by surface **151**.

An L-shaped support **144** having a downwardly depending surface **146** is joined to the yoke **108** by any convenient means such as a screw **148** which passes through an aperture in the yoke and threadedly engages the L-shaped support. As described, the yoke **108** is rotatably mounted on the base member **118** and may be moved away from the reel **100** by moving the handle **116** to disengage the keeper **112** from the hook **110**. Since the tab forming apparatus **2** is supported by the yoke **108**, movement of the yoke in an upward direction causes a corresponding movement of the apparatus **2** and the guide rolls **106**.

In a further embodiment of the invention illustrated in FIG. **12**, my tab forming apparatus **2** may be employed in combination with a sync-block **150** which, although similar in structure to sync-block **98**, supports a plurality of rotatable reels each of which guides an audio or visual tape **154**. In this embodiment, a tab forming apparatus **2** is supported adjacent each of the reels described previously such that tabs may be formed and applied to each of the separate tapes **154**. On rotation of a control knob **152**, each of the tapes **154** is, therefore, positioned with respect to a tab forming apparatus **2**. The sync-block **150**, being structurally similar to sync-block **98**, may include a counter and a dial to indicate the rotational movement of the reels, a yoke to support the guide rolls and the tab forming apparatus and a lock lever to fix the position of the reels during placement of a tab on one or more of the tapes **154**.

I claim:

1. An apparatus for cutting a tab from a tape, said apparatus comprising:
- a reciprocable punch;
- a reciprocable actuator for said punch;
- guide means having an opening which slidably receives said punch;
- a die positioned a spaced distance below said guide means and having an opening in alignment with the opening in said guide means;
- means for positioning a tape at approximately right angles to the movement of said punch and within an opening defined by the spaced distance between said guide means and said die;
- means for moving said tape in a line of travel at approximately a right angle to the direction of movement of said punch;
- adjustable drive means for transmitting the movement of said punch to a take-up reel for said tape with the distance of movement of said tape being adjustable with respect to the distance of movement of said punch;
- friction means controlling the speed of movement of said tape and the moving force applied to said tape, and
- pivotal connecting means joining said punch and said actuator,
- whereby said actuator is permitted to pivot with respect to said punch while maintaining the alignment of said punch within said guide means.

2. The apparatus of claim **1** including centering means for said tape, whereby the position of the long dimension of said tape is maintained with respect to the opening in said guide means and the opening in said die.

3. The apparatus of claim **1** wherein said die and said punch have correspondingly curved lower surfaces.

4. An apparatus for cutting a tab from a tape, said apparatus comprising:
- a reciprocable punch;
- a die having a die opening in alignment with said punch;
- means to move a tape past said die opening and between said die opening and said punch;
- adjustable drive means for transmitting the movement of said punch to a take-up reel for said tape with the distance of movement of said tape being adjustable with respect to each reciprocation of said punch, and
- friction means controlling the speed of movement of said tape and the moving force applied to said tape.

5. The apparatus of claim **4** including centering means for said tape, whereby the long dimension of said tape is centered with respect to the opening in said die.

6. The apparatus of claim **4** wherein said die and said punch have correspondingly curved lower surfaces.

7. In combination, an apparatus for cutting a tab from a tape and applying the tab to an audio or visual tape and means for positioning an audio or visual tape with respect to the apparatus, said combination comprising:
- a rotatable reel for supporting an audio or visual tape;
- said reel including a curved supporting surface for engagement with an audio or visual tape;
- a reciprocable punch;

guide means having an opening which slidably receives said punch;

a die positioned a spaced distance below said guide means and defining an opening by the spaced distance between said guide means and said die;

means to position said punch in alignment with the curved supporting surface of said reel for movement of the punch into contact with an audio or visual tape engaged by said curved supporting surface;

said punch having a contacting face which is curved to correspond with the curvature of said supporting surface, and

means to position a tab-forming tape at approximately a right angle to the movement of said punch and within an opening defined by the spaced distance between said guide means and said die,

whereby reciprocation of the punch moves the punch into contact with the die to form a tab from the tab-forming tape and continued punch movement brings the curved contacting face into contact with the curved supporting surface of the reel.

8. The combination of claim **7** including

projections on the curved supporting surface of the reel which engage apertures positioned adjacent a side of the audio or visual tape, and

said punch being shaped and positioned for movement of said contacting face into engagement with an area of said curved supporting surface which is positioned between said projections,

whereby a tab carried by said punch is placed adjacent the side edge of an audio or visual tape supported by said reel and between the apertures adjacent a side of the audio or visual tape.

9. The combination of claim **7** including

a curved surface on said die which is curved to correspond with the curvature of said curved supporting surface, and

means to position the curved die surface closely adjacent to the curved supporting surface of the reel during reciprocation of said punch to bring the curved contacting face into contact with the curved supporting surface.

10. The combination of claim **8** including

a curved surface on said die which is curved to correspond with the curvature of said curved supporting surface;

means to position the curved die surface closely adjacent to the curved supporting surface during reciprocation of said punch to bring the curved contacting face into contact with the curved supporting surface, and

depressions in the curved surface of said die which are positioned in overlying relation with the projections on said reel when the curved die surface is closely adjacent to the curved supporting surface of said reel.

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