

Feb. 20, 1968

S. M. BAKER ET AL

3,369,573

TYING APPARATUS

Filed Oct. 23, 1964

7 Sheets-Sheet 1

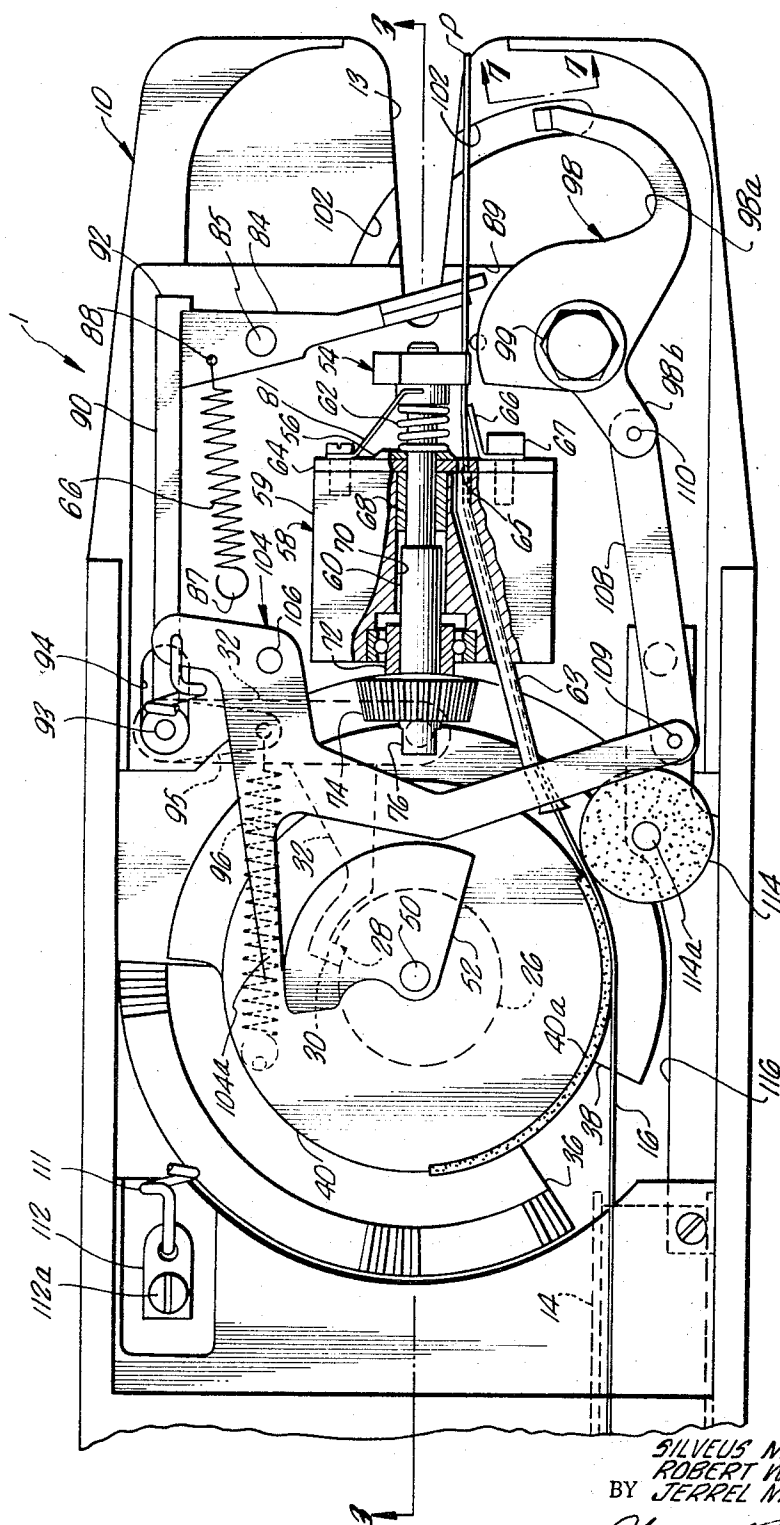


FIG. 1

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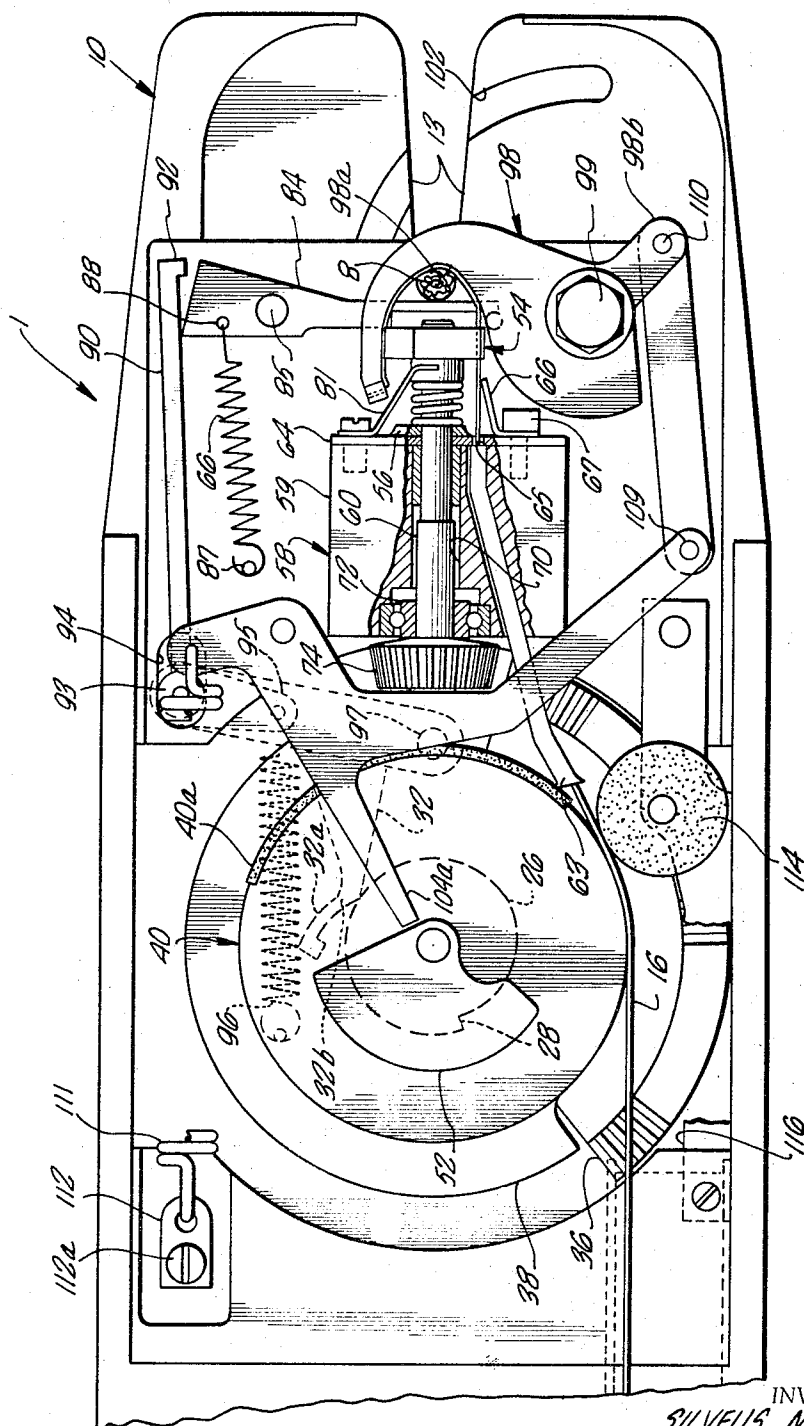
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Fig. 2-



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FIG. 3

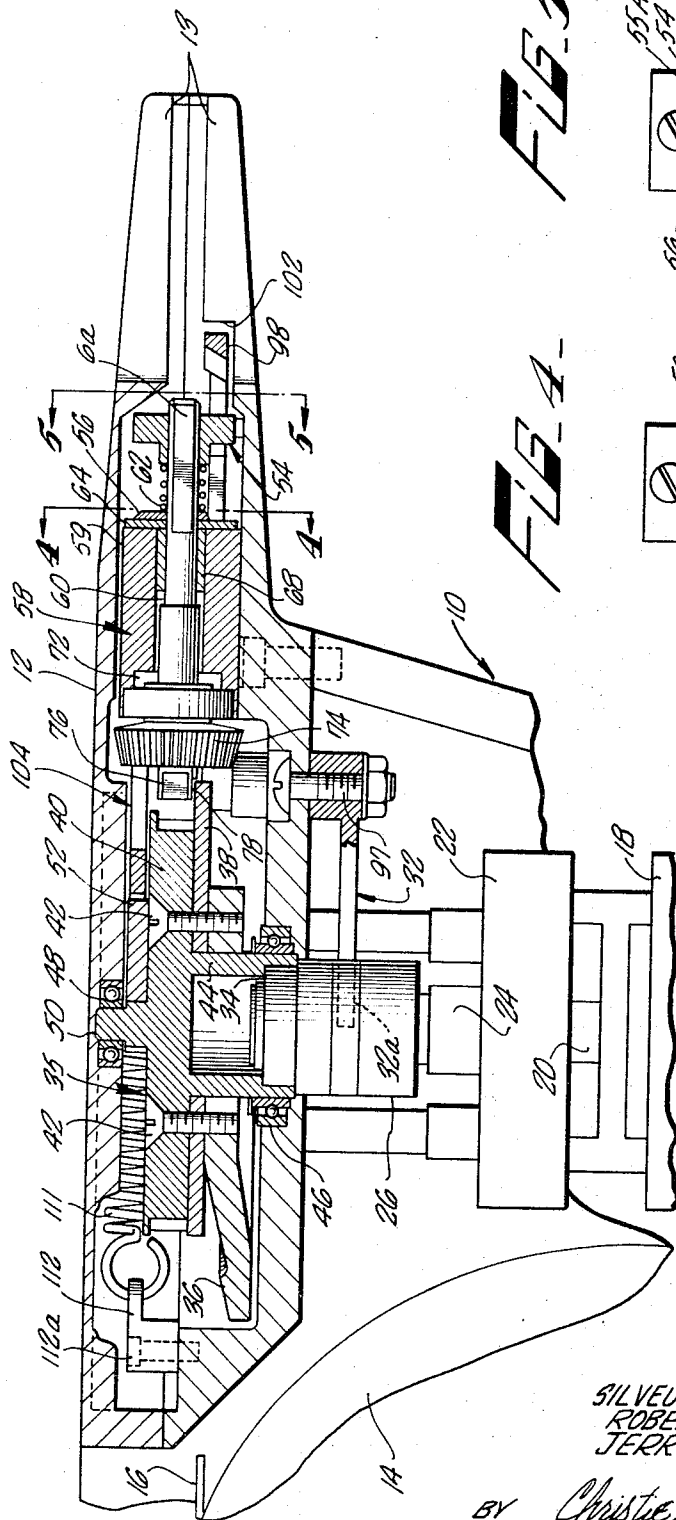


FIG. 5

FIG. 4

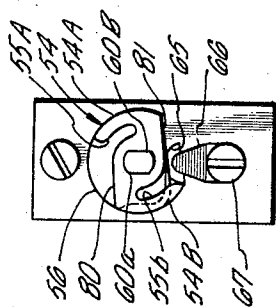
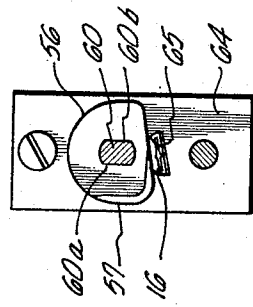
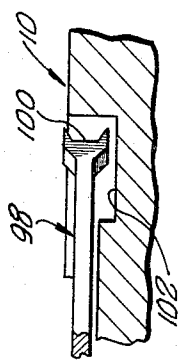


FIG. 7



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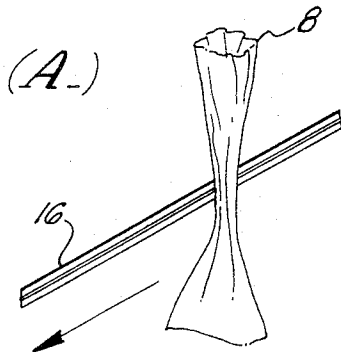
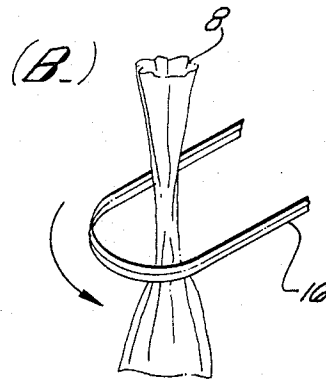
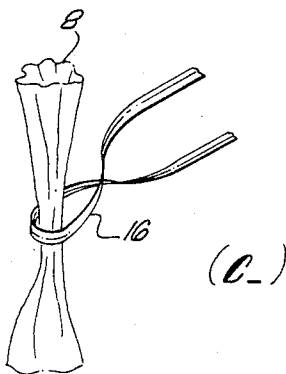
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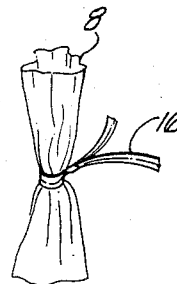
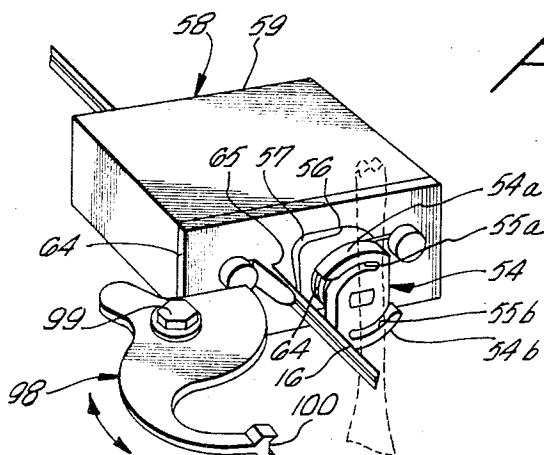


FIG 8

FIG 6



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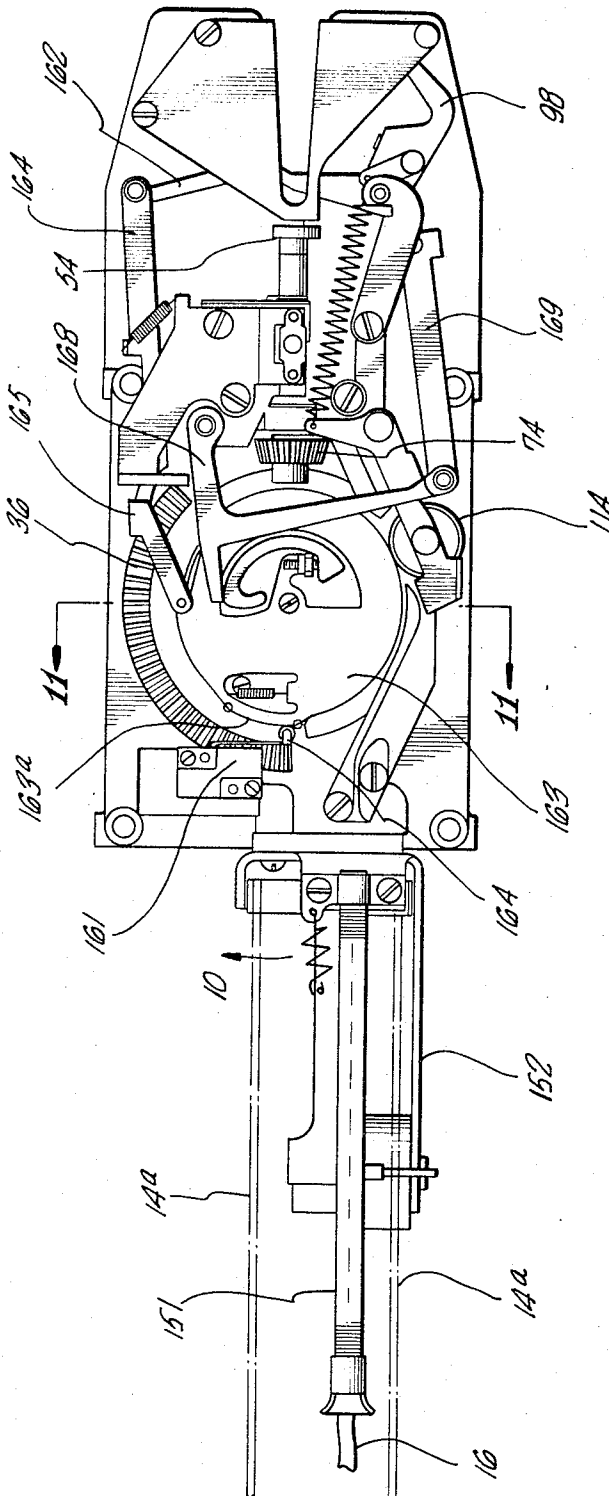
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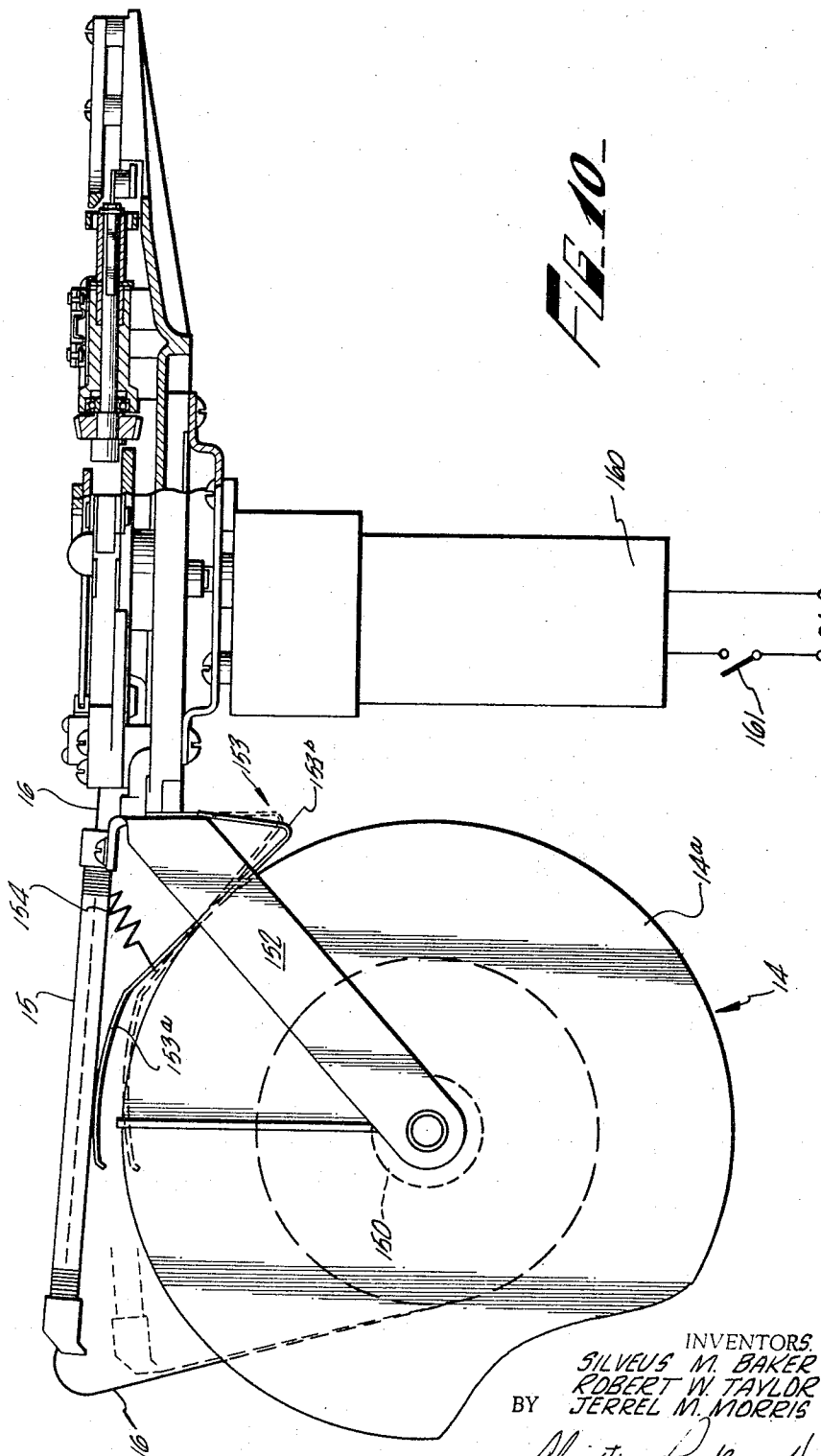
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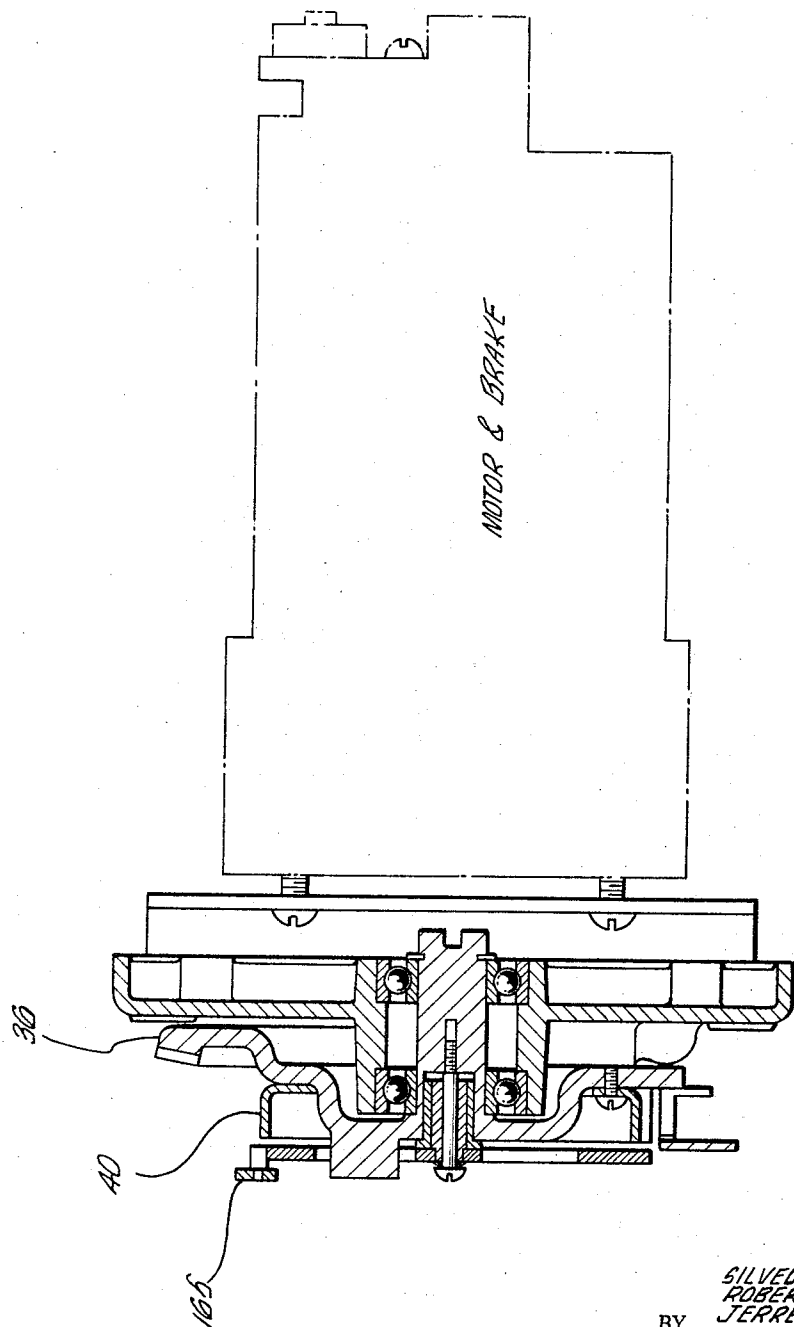


FIG. 11

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3,369,573

TYING APPARATUS

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Continuation-in-part of application Ser. No. 341,954, Feb. 3, 1964. This application Oct. 23, 1964, Ser. No. 406,960

12 Claims. (Cl. 140—93.6)

ABSTRACT OF THE DISCLOSURE

Tying apparatus for tying articles with resilient tie material capable of being twisted to form a tie by automatically actuating the machine upon presentation of an article to be tied to cause the tie material to be wrapped around the article to be tied and tied thereto allowing the tied article to be removed from the tying apparatus.

The tying apparatus includes a trigger actuator for engaging an article to be tied in its path to the tying and cutting device to actuate the apparatus for a tying cycle. Upon actuating the apparatus, a preselected length of tie material is advanced adjacent the tying and cutting device and a tie material wrapping arm. The delivery of the tie material causes the wrapping arm to wrap the adjacent length of tie material around the article to be tied in a substantially U-shaped configuration. Sequentially, then, the wrapped tie material is engaged by the tying and cutting device and twisted upon itself while substantially simultaneously severing the material from its source of supply thereby allowing the tied article to be removed from the apparatus.

This application is a continuation-in-part of Ser. No. 341,954, filed Feb. 3, 1964, and now abandoned.

This invention relates to apparatus for twisting ties about items such as the tops of open mouth bags and like articles.

Bag tying apparatus is known for automatically tying the tops of open top bags through a series of operations which are generally conducted on a production line basis. The known devices generally gather the mouth of each successive bag into a generally cylindrical form, and at one or more stations, pass a tie or loop of wire around the gathered neck, cut the loop so formed, and to twist the tie or wire to prevent the loss of the articles contained within the bag. These devices are constructed to operate automatically and by their very nature require an intricate group of operating machinery to perform the tying operation. The automatic tying variety of machinery tends to be quite complex, and difficult to maintain and repair, and tends to be rather expensive such that the operation is only economically feasible when conducted on a high production basis.

Places of business such as grocery stores, bakeries, supermarkets, and the like, sometimes require sporadic packaging of articles such as bread, vegetables, granular material, and the like. This operation is generally done on the premises requiring some hand labor be involved, with the tying operation becoming a necessity to prevent loss of the articles in the bag.

In accordance with our invention, we provide a bag tying mechanism which operates on a very minimum of parts performing a plurality of functions.

Briefly, to accomplish this, the present invention provides a tie feeding means, a tie wrapping device, and a tie twister head and shear blade which operate simultaneously by the same actuating means. A program plate provides the power for operating the feeding device, the

wrapping means and the twister head and shear blade. A trigger arm is placed at the rear of a bag gathering groove which when motivated by the bag will automatically start the operation to automatically tie the bag without the operator requiring to actuate the device manually.

The present invention is not necessarily limited to tying the tops of bags but may be used for tying any portion of a bag or in its broadest sense may be used to tie articles with or without bags and tie them in any manner, although particularly adapted to handle ties of type shown in Patent 3,068,135. The term "bag" as used herein covers all types of pouches, sacks, and receptacles. The term "tie" as used herein includes all types of bond, link, or connection. A change in the size or shape of the components would not depart from the spirit of the present invention but still would adapt the tying apparatus to be used to tie any type of article with any type of tie.

Other features and advantages of this invention will become apparent from the following detailed description and the accompanying drawings, of which:

FIG. 1 is a top view of the tying machine, with the cover removed, and constructed according to the present invention with its components arranged such that a bag may be inserted to be tied;

FIG. 2 is a top view of the bag tying machine illustrated in FIG. 1 with a bag top inserted within the device and a tie doubled around the top of the bag prior to the twisting of the ties;

FIG. 3 is a side elevation, shown partially as a cross sectional view, with the section taken at line 3—3 of FIG. 1;

FIG. 4 is a cross sectional view of the shear block and shear blade, with the section taken at line 4—4 in FIG. 3;

FIG. 5 is a front elevation illustrating the twister head, the shear blade, and the tie guide with the view taken at line 5—5 of FIG. 3;

FIG. 6 is a perspective view of the twister head, the shear blade, and shear block with a tie passing through the shear block ready to be doubled over by the wrapping arm;

FIG. 7 is a partial, cross sectional view illustrating the tie guide extremity of the wrapping arm taken along line 7—7 in FIG. 1;

FIGS. 8A, B, C, and D illustrates the progressive movement of the tie around the top of the bag as accomplished by the machine of the present invention.

FIG. 9 is a top view, with cover removed, of a modified tying machine and embodying the invention;

FIG. 10 is a sectional view, with portions shown in elevation, taken along the line 10—10 of FIG. 9 and

FIG. 11 is a sectional view taken along the line 11—11 and illustrating the motor and brake in dotted outline.

Referring to the drawings, FIGS. 1, 2, and 3 show a tying apparatus 1 constructed according to the present invention. The machine comprises a frame 10 having a removable cover 12 thereon and adapted to be secured to a counter top (not shown).

A V-shaped groove 13 is formed in the frame 10 having converging walls for purposes of gathering the sides of the bag to be tied.

A spool 14 mounted upon a shaft (not shown) which is fixedly attached to the frame 10 contains tie 16 in a coil form and the material may be of any suitable variety and includes such things as soft iron wire, but more preferably includes paper or plastic covered soft wire as mentioned hereinabove. It is the general practice today generally to use a wire covered with a sheet of paper or plastic which is attached to each side of the wire such that the resultant structure is a flat tape having a soft

wire core. Any suitable restraining device may be affixed to the spool 14 to prevent the spool from running free.

For purposes of actuating the tying mechanism, there is provided a conventional electric motor 18 with a shaft 20 which is engaged with a gear box 22 for purposes of reducing the speed of the motor output shaft 20. A shaft 24 extends outwardly from gear box 22 and has mounted thereon a conventional one way clutch 26 having formed thereon a stop 28 which is engageable with a dog 30 formed on movable arm 32. Clutch 26 is of a conventional design and one acceptable construction is illustrated in detail on p. 82 of *Ingenious Mechanisms for Designers and Inventors*, vol. 2, edited by Franklin D. Jones, The Industrial Press, 1936, New York, N.Y. This clutch is used for transforming continuous rotary motion into intermittent rotary motion allowing a single rotation of shaft 34 after the dog 30 engages stop 28. In this manner, motor 18 may be continuously rotated and as desired, the clutch 26 may be engaged by arm 32 to activate the tying mechanism. A number of other suitable clutches for performing the same function are available on the market today.

A program plate 35 comprises a segmented bevel gear 36, a flat segmented plate 38, and a friction feeding disc 40, all of which are attached to each other by a pair of flat head machine screws 42. A hub 44 integrally formed on the feeding device 40 extends downwardly through the segmented plate 38 and segmented bevel gear 36 and is pressed upon the output shaft 34 extending from clutch 26. A ball bearing 46 is pressed around the periphery of the hub 44 and a ball bearing 48 is pressed upon post 50 and the cover 12 thereby providing stability and allows rotation of the program plate 35. A cam 52 rests upon the upper portion of feeding disc 40 and is pressed upon the post 50. It is noted that the gear 36, plate 38, feeding disc 40, and cam 52 are all positioned with a different angular relation to each other and the particular purpose of this interrelation will become apparent in the discussion of the operation of the present invention.

A means for severing and twisting a tie includes a twister head 54, a shear blade 56, and a shear block 58. Twister head 54 is locked upon the shaft 60 along with shear blade 56 by a pair of flats 60A and 60B formed on opposite sides of shaft 60. Spring 62 constantly urges shear blade 56 against the shear plate 64 thereby insuring shearing action. A metal tubing 63 is mounted in a passageway of shear block 58 which directs the tie 16 therein projecting it toward twister head 54. Guide 66 is mounted upon the block 58 by screw 67 passing there-through and retaining both guide 66 and the shear blade 64 to the block 58. Guide 66 prevents the tie 16 from being diverted laterally with relation to the twister head 54 where it is being fed outwardly toward the right hand portion of the bag tying apparatus 1. A shaft 60 is supported on one end by a journal bearing 68 received within the main passageway 70 and ball bearing 72 mounted at its opposite end. The shaft 60 terminates in a bevel pinion gear 74 which is engageable with the segmented bevel gear 36. Shaft 60 has an extension 76 extending axially from gear 74, with a step 78 which is formed on portion 74 for engagement with segmented plate 38 (see FIG. 3) for purposes of preventing rotation of twister head 54 and shear blade 56 during a certain portion of the rotation of the program plate 35. Referring to FIG. 4, the opening 65 in shear blade 64 is shaped such that the tie 16 is wedged therein as shear blade 56 is rotated by shaft 60 until the cutting edge 57 severs tie 16.

Referring now to FIG. 5, the twister head 54 has a profile having a generally Z shaped configuration, a pair of arcuately shaped arms or fingers 54A and 54B and a pair of arcuately shaped slots 55A and 55B. A pair of flats 80, 81 are formed on opposite sides of twister head 54 and are substantially parallel to each other. As illustrated in FIG. 5, the proximate relation of the opening

at 65 in shear blade 64 directs the tie 16 adjacent to the flat 81 thereby allowing the tie 16 to be in alignment with slot 55B upon rotation of twister head 54. Similar action occurs on the opposite side of twister head 54 upon the doubling over of the tie 16 as illustrated in FIGS. 2 and 8B.

Guide 81 is fixedly mounted to block 59 and has an extremity formed in the shape of a foot 82, which is positioned parallel to the rotation of twister head 54, which tends to urge the tie 16 into engagement with twister head 54, and aids in more tightly twisting tie 16 upon the bag 8.

For purposes of starting the tying operation, a trigger arm 84, pivotally mounted upon post 85, normally assumes a position illustrated in FIG. 1 by the action of a coil spring 86 mounted between pin 87 and pin hole 88 urging the arm 84 against the ledge 89. An L shaped latch 90 having a tab 92 formed thereon normally engages the trigger arm 84, as illustrated in FIG. 1. Shaft 93 is fixedly mounted to latch 90 and extends downwardly through an elongated slot 94 formed in frame 10. Coil spring 96 constantly urges crankarm 95, latch 90, and arm 32, all of which are attached to shaft 93, in the counter-clockwise direction pivoting around bolt 97, illustrated in FIG. 3. Arm 32 includes a finger 32A, having a latch 32B formed thereon which engages the stop 28 on the rotatable clutch 26 thus preventing the transfer of motion through clutch 26 when the apparatus is in the position illustrated in FIG. 1.

Upon rotation of trigger arm 84 by the bag as illustrated in FIG. 2, latch 90 is shifted upwardly laterally toward the right as illustrated in FIG. 2. Arm 32 and crankarm 95 are pivoted clockwise around bolt 97 thus lifting finger 32A upwardly and allowing the clutch 26 to transfer power to the program plate 35 allowing it to rotate through one complete revolution.

As illustrated in FIGS. 1-3, 6 and 7, a means for wrapping a tie a portion of a distance around the bag includes a U shaped wrapping finger 98 pivotally mounted upon a bolt 99 which is within frame 10. As illustrated in FIG. 7, wrapping finger 98 has a guide 100 formed at its extremity for retaining the tie 16 while it is being doubled over to the U shaped position illustrated in FIG. 2. An outwardly shaped slot 102 is cut into the frame 10, receives the extremity of wrapping finger 98, and helps retain tie 16 during the wrapping operation. Finger 98 is operated by rotation of a generally T shaped member 104 and link 108. Member 104 is pivotally mounted upon frame 10 by a pin 106 passing therethrough and link 108 is pivotally attached to member 104 by pin 109 and also pivotally mounted on finger 98 by pin 110. Spring 111 engages T-shaped member 104 and is restrained by bracket 112 which is attached to frame 10 by bolt 112A. The normal position of finger 98 is illustrated in FIG. 1 since spring 111 constantly urges member 104 in the counter-clockwise direction thereby tending to laterally shift link 108 generally to the right and pivot finger 98 counter-clockwise until the U shaped surface 98A engages the gathered portion of bag 8. Arm 104A extends radially from the T shaped member 104 and rides on the cam 52 during a portion of its rotation thereby causing the member 104 to be pivoted clockwise, dragging link 108, and pivoting wrapping finger 98 clockwise to the position illustrated in FIG. 1. Thus it will be appreciated that as arm 104A drops from cam 52, spring 111 will pivot member 104, drag link 108, and pivot wrapping finger 98 to the position illustrated in FIG. 2.

The means for feeding tie 16 includes feeding disc 40 and idler 114. Feeding disc 40 has thereon a strip 40A fabricated from an elastomer, rubber or the like and is fixedly attached to a portion of the periphery. Idler 114 rotates about pin 114A that is mounted on the member 116. Thus it will be appreciated that strip 40A

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forces tie 16 against idler 114 thus pulling the tie 16 from the supply reel 14 during that portion of the rotation of program plate 35 during which strip 40A is proximate to idler 114. Therefore the circumference of strip 40A is the increment of feed of tie 16 and this length is graphically illustrated in FIG. 1 which is the distance from point "P" to the surface of the shear plate 64.

Referring again to FIGS. 1, 2, and 3, a means for preventing rotation of the shaft 60, shear blade 56, and twister head 54 includes the interengagement of plate 38 with the flat 78 formed on extension 76. As illustrated in FIG. 3, the shaft 60 and the associated components mounted thereon cannot rotate while the plate 38 is positioned below post 76, since step 78 prevents rotation thereof. Plate 38 extends only around a portion of the program plate and thus after sufficient rotation, shaft 60 is free to rotate upon engagement of pinion 74 with segmented bevel gear 36. Disc 38 and post 76 keep the proper alignment of gear 74 and gear 36 to prevent clashing or locking upon engagement and also twister head 54 and shear blade 56 are kept in proper relation.

Twister head 54 only rotates during the engagement of segmented bevel gear 36 with pinion 74. It has been found in practice that approximately $1\frac{1}{2}$ rotations of twister head 54 are all that are necessary to sufficiently twist tie 16 around a bag in order to retain it in place and prevent loss of the items within the bag.

Referring now to FIG. 8, the process of tying the bag will now be described. The bag 8 is filled with the desired articles and the open top is gathered by hand to close the top end and make the bag receptive for applying the tie. A metered amount of tie 16 is directed transverse to the open bag as shown in FIG. 8A, and the tie 16 is doubled over as shown in FIG. 8B without severing the tie. Simultaneously, tie 16 is severed and twisting is commenced as illustrated in FIG. 8C with the twisting continued to the desired number of turns as illustrated in FIG. 8D.

The operation of the apparatus will now be described.

Referring to FIGS. 1, 2, and 3, motor 18 is energized by a suitable power supply (not shown), hereby supplying rotative motion to output shaft 20, gear box 22, shaft 24, and clutch 26. In the position illustrated in FIG. 1, clutch 26 is disengaged thereby not allowing power to be transmitted to the output shaft 34. The present invention allows the motor to be operated constantly during the normal working day, awaiting actuation by the operator.

The bag 8 is filled with articles to a desired height either manually or automatically by suitable filling means, and the open top is gathered by hand to the point where the bag top may enter the V shaped grove 13 in frame 10. The operator may hold the bag 8 by one hand adjacent the open top as he inserts it into groove 13, forcing it outwardly until trigger arm 84 is pivoted clockwise. This action rotates latch 90 slightly counterclockwise and laterally toward the right against the tension of spring 96. Coincidentally, arm 32 is pivoted clockwise around pin 97 until toe 32B lifts from the stop 28 of clutch 26. Power is then supplied through clutch 26 rotating the program plate 35 through one complete revolution which takes an average of 2 seconds during which the following motions and steps occur.

It is presumed that tie 16 has been drawn from reel 14, extending between strip 40A and idler 114, through the tube 63 and extending through opening 65 in shear plate 64. Rotation of program plate 35 from the position illustrated in FIG. 1, will pull tie 16 from reel 14 by the co-action of strip 40A on the feeding disc 40. Tie 16 will then extend past twister head 54 substantially parallel to the axis of shaft 60 until it reaches point "P" which is the metered amount of feed during each revolution of the program plate 35.

Concurrently, cam 52 is rotated to the point where arm 104A is no longer in engagement therewith and allows the T-shaped member 104 to pivot counterclockwise

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around pin 106 caused by the tension of spring 111. Link 108 is shifted laterally to the right causing wrapping finger 98 to be pivoted counterclockwise. Guide 100 (see FIG. 7) on wrapping finger 98 forces tie 16 in its extended position around bag 8 until it is doubled over as is illustrated in FIG. 2 and FIG. 8B. The rapid movement of wrapping finger 98 prevents tie 16 from being dislodged from the guide 100.

At this period of rotation of program plate 35, post 76 and flat 78 are no longer in engagement with segmented plate 38 and as the segmented gear 36 engages pinion 34, the entire assembly of pinion 74, shaft 60, blade 56, and twister head 54 will then rotate during the entire time that pinion 74 is in engagement with gear 36. Shear blade 57 will rotate counterclockwise severing tie 16 (see FIG. 4) and simultaneously twister head 54 will rotate to start twisting tie 16 as illustrated in FIG. 8C. At the start of the twisting operation, the U shaped tie passes in juxtaposition to the flats 80 and 81 on opposite sides of twister head 54. Rotation of head 54 causes the ties to enter the accurately shaped slots 55A and 55B. Guide 81 with foot 82 forces the tie 16 against the back portion of twister head 54 for the purposes of tightly twisting the tie until it assumes the fully twisted position as illustrated in FIG. 8D.

The twisting operation is then complete and the operator may remove the tied bag from groove 13. Arm 84 again assumes the position in FIG. 1, allowing latch 90 to return to its original position and return stop 32B abuts stop 28. Program plate 35 has made one complete revolution and has stopped in the position illustrated in FIG. 1 ready for subsequent actuation by a bag to be thrust against trigger arm 84 to again repeat the operation.

Now referring to FIGS. 9 through 11, a modified embodiment of the tie apparatus will be described. The tying apparatus illustrated in FIGS. 9 through 11 is generally of the same construction and operation as the previously described embodiment but has specific provisions for preventing the unraveling of the tie material from its storage location during the intervals that the machine is inoperative and thereby always assures proper operation of the tying machine. The additional modifications illustrated in these views are principally for reducing the manufacturing cost of the tying machine. To this end, the single revolution clutch described in the previous embodiment has been omitted and a combination motor-brake arrangement controlled by means of a snap-action switch provides the single revolution for programming the various operations of the machine. For the present, then, the operation of the tying head will be ignored and the structure and the operation of the braking mechanism will first be examined.

As in the previous embodiment, the tie material or tape is stored on a reel 14 mounted to the rear of the machine from the article tie end thereof. As illustrated, the tie material 16 is stored on the reel 14 which is comprised of a pair of spaced flanges similar to the illustrated flange 14A. The tie material is stored on the spindle 150 for the reel 14 as is conventional. The tie material then is unwrapped from the spindle 150 and passed through a tape guide 151 comprising an elongated, tubular spring mounted in a cantilever relationship with the machine frame as illustrated. The tie material is then passed from the tape guide 151 to the idler roller 114 adjacent the periphery thereof as in the previous embodiment, for supplying the tie cutting and twisting head proper.

The tape guide 151 is resiliently mounted in a cantilever fashion so as to have its free end movable in a vertical direction in response to the tension or pulling of the tie material 16 when the idler roller 114 functions to feed the tie material to the tying head proper. To this end, coating with the tape guide 151 is a braking mechanism functioning to normally brake the reel 152. An examination of FIG. 10 reveals that the reel 14 is mounted to the machine frame by means of a pair of supporting arms

152 mounted on the outside of the flanges 14A and secured to the spindle 150. The reel brake 153 is mounted to co-act with the movable tape guide 151 and to be responsive to the vertical movement of the guide 151 to place the brake 153 into engagement with the outer periphery of the flanges 14A when the machine is inoperative and to be moved out of engagement with the flanges 14A when the tape is placed under tension by means of the feed roller 114 to allow rotation of the reel 14. To this end, the brake 153 comprises a pair of resilient arms similar to arm 153A and having one end engaging the tape guide 151 intermediate its ends to be responsive to the movement of the free end of the guide 151 and has its opposite end constructed in a V shape configuration to engage the outer periphery of the flanges 14A. This latter mentioned end of the brake arm 153 is further identified by the reference character 153B. The arm 153 is resiliently mounted intermediate its ends by means of a tension spring 154 secured thereto and to the frame of the machine as illustrated.

It should now be appreciated that when the tie material 16 is fed by means of the inter-engagement of the idler roller 114 and the feeding portion 40A of the feeding disc 40 that the tie material will initially be placed under tension and thereby causes the free end of the tape guide 151 to move in a downward direction as illustrated in dotted outline, and thereby causes the portion 153A of the brake arm 153 to be moved in a downward direction as is also indicated in dotted outline to cause the opposite end or the end 153B to be moved away from the flange 14A and allow the reel 14 to rotate freely. Of course when the feed portion 40A of the feeding disc 40 is no longer engaged, the tension on the tie material 16 will be released allowing the tape guide 151 and the brake arm 153 to assume its normal braking position in engagement with the flange 14A to prevent its continuous rotation and thereby prevent the unraveling of the tie material 16 from the reel 14.

It should now be appreciated that an important feature of the tying apparatus is the provision of some specific means for preventing the unraveling of the tie material 16 from its supply during the intervals the machine is not in operation and/or the tie material is not being fed to the tying head. If the tie material 16 is to become unraveled during these intervals, it may well render the tying apparatus inoperative until the material is placed in a correct relationship in regard to the mechanism for twisting and tying.

Now, referring to the drive portion of the tying mechanism for this modified tying apparatus, it should be noted that the single revolution clutch of the previous embodiment has been eliminated and a combination motor and brake 160 has been substituted therefor providing the single revolution for effecting the tying operations. To this end the co-action of the motor and brake is such that the brake is always applied to the motor shaft to prevent its rotation during the intervals when the motor is de-energized and is released therefrom during the intervals when the motor is energized. The energization and the de-energization of the motor and brake 160 is effected by means of the conventional snap acting switch 161 included in series with the supply-line to the motor-brake 160 as will become evident hereinafter. The motor-brake combination 160 is of conventional construction wherein the brake is a solenoid operated brake utilized in conjunction with a gear motor of the type manufactured and sold by the Von Weise Gear Co., of St. Louis, Mo., such as the model VW-1A motor arrangement.

As is the previous embodiment, the tying apparatus utilizes a trigger means or arm positioned in the throat of the tying apparatus to intercept the article to be tied as it is positioned adjacent the tying and cutting head 54. The trigger arm is identified by the reference character 162 and is essentially of the same construction as in the

previous embodiment. The trigger arm 162 in this embodiment, however, is connected to a switch actuating cam 163 by means of link arms 164 and 165. These arms are connected as illustrated with the free-end of the arm 165 being secured to the cam 163 to render the cam 163 responsive to the movement of the trigger arm 162 upon engaging the article to be tied and being moved therewith in its path towards the cutting head 54. To this end, the link 165 is secured adjacent the outer periphery of the cam 163 to cause it to rotate in a counter-clockwise direction. The cam 163 is designed with a raised portion 163A adjacent to the outer periphery for engaging an operating arm 164 secured to the snap-acting switch 161 controlling the motor-brake 160. This position of switch 161 maintains an open circuit condition to the motor-brake 160 as long as the operating arm 164 and the cam portion 163A are in engagement. The movement of the trigger arm 162 is effective to cause approximately 30° of rotation of the cam 163 after which interval the operating arm 164 will ride off of the raised portion 163A of the cam 163 and allow the operating arm 164 to move in a switch closing direction to thereby energize the drive motor and simultaneously de-energize its associated brake to provide a single revolution of the programming means. The motor-brake 160 is de-energized when the cam 163 rotates to the position placing the raised portion 163A into engagement with the switch operating arm 164.

It will also be appreciated that the action of the wrapping finger 98 for wrapping the tie material 16 in an essentially U shaped configuration around the article to be tied is controlled by means of the cam 163 through the linkages comprising the essentially T shaped arm 168 and the wrapping finger operating link 169. This action is essentially the same as in the previous embodiment and is initiated by the programming means after the tie material 16 is fed into a tying position.

What is claimed is:

1. Apparatus for tying articles with tie material capable of being twisted to form a tie comprising a rotatable cutting and twisting head, means for storing a continuous length of tie material, means for feeding a preselected length of the tie material adjacent said head is an essentially U shaped configuration to be operated on by said head, and drive means connected to said feeding means and said twisting head for operating same to cause the preselected length of tie material to be severed from its continuous length and to be simultaneously twisted upon itself and thereby tied about an article during the rotation of said head.

2. Apparatus for tying articles with tie material as defined in claim 1 wherein the rotatable cutting and twisting head comprises a cutting element and a twisting element mounted in a coaxial relationship with the twisting element being defined with a pair of twisting sockets for receiving the tie material.

3. Tying apparatus comprising means for storing a continuous length of tie material, means for feeding a preselected length of tie material from said storing means and loosely wrapping it around an article to be tied in a U shaped configuration, tying and cutting means operative for receiving the opposed arms of the U shaped tie material and twisting them together while simultaneously severing the material from the continuous length thereof, drive means coupled to operate said feeding means and said tying and cutting means for a preselected tying interval, and actuating means movably mounted adjacent said tying and cutting means to intercept an article to be tied and moveable in response to the positioning of the article adjacent said tying and cutting means for actuating said drive means for said preselected tying interval.

4. Tying apparatus comprising a frame, means for storing a continuous length of tie material mounted on the frame, a cutting and twisting head mounted on the

frame in spaced relationship with the storing means, drive means mounted on the frame and connected to said head for actuating same, trigger means movably mounted adjacent said head to intercept an article to be tied and responsive to the engagement of an article therewith for actuating the drive means for a preselected interval, and means responsive to the actuation of said drive means for feeding a preselected length of tie material adjacent said head in a position to be twisted and tied to the article and simultaneously severed from the continuous length of tie material by said head.

5. Tying apparatus comprising means for storing a continuous length of tie material, a rotatable cutting and twisting head for receiving tie material and twisting it on itself about an article to be tied and cutting it from the continuous length, a wrapping finger movably mounted adjacent said head for movement into engagement with the tie material for loosely wrapping it around an article to be tied and to thereby position the free end of the tie material to be received by said head, means for receiving the tie material from said storing means and feeding a preselected length of tie material adjacent said wrapping finger, trigger means mounted to intercept an article to be tied when positioning the article adjacent said head and to be movable therewith, drive means connected to be responsive to the movement of the trigger means towards said head to be actuated thereby for a preselected interval and connected for actuating said feeding means, wrapping finger and cutting and twisting head for operating same in a preselected sequence during said interval whereby the portions of tie material received by said head may be simultaneously twisted around the article to be tied and cut from the continuous length of the material.

6. Tying apparatus as defined in claim 5 wherein said tie material storing means is a rotatable spool storing said material and includes means for preventing rotation of said spool except during the intervals the tie material feeding means is actuated.

7. Apparatus for tying articles with tie material capable of being twisted to form a tie comprising a rotatable cutting and twisting head, a rotatable reel for storing continuous length of tie material thereon, friction drive means for delivering tie material of a preselected length to said head to allow for the twisting and tying of the material to an article and cutting said length of tie from the continuous length on said reel, movable tie material guide means mounted intermediate said reel and said drive means for guiding said length of tie to said drive means and being movable in response to the feeding of the tie material to said head, and brake means mounted in engagement with the reel to prevent the rotation of the reel and resiliently mounted with said tape guide means to be responsive to the movement thereof for movement away from said reel to allow the tie material to be supplied from the reel only during the intervals the tie material is being delivered and drive means adapted to be actuated in response to the placement of an article to be tied into the apparatus for activating said cutting and twisting head and tie material guide means for preselected intervals in a predetermined sequence for guiding the tie material around the article to be tied and tying same by twisting it upon itself.

8. Apparatus for tying articles as defined in claim 7 wherein the friction drive means comprises an idler roller and a feed plate having a drive strip of a preselected length for engaging the idler roller to drive tie material therebetween only when the drive strip and idler roller are in driving engagement, the length of the drive strip determining the length of the material delivered to the cutting and twisting head.

9. Tying apparatus comprising:

a program plate mounted for rotation including a cam, feeding disc, segmented plate, and a gear segment so

mounted on the plate such that each is effective only for a portion of the rotation of the program plate, a resilient strip mounted on the feeding disc, an idler rotatably mounted in spaced relation with the feeding disc resilient strip such that a tie placed between the idler and the feeding disc strip would be advanced upon rotation of the program plate, means for simultaneously severing and twisting a tie including a pinion engageable with the program plate gear segment and an element engageable with the disc segment such that the gear may not be rotated during engagement of the element with the disc segment, means for wrapping a tie including associated operating linkage engageable with the program plate such that rotation of the cam operates the wrapping means through the action of the linkage, and means arranged in engagement with the program plate for intermittently operating same.

10. Tying apparatus comprising:

a program plate including a cam, feeding disc, plate segment, and a gear segment mounted on the program plate so that each is effective only for a portion of the rotation of the program plate, a resilient strip mounted on the feeding disc over a portion of the disc, an idler rotatably mounted in spaced relation with the feeding disc resilient strip such that a tie placed between the idler and the feeding disc strip would be advanced upon rotation of the program plate, a shear block having a passageway therethrough, a shaft having a twister head and shear blade mounted thereon and mounted in the shear block passageway, means mounted on the program plate for preventing rotation of the shaft during a portion of the rotation of the program plate, a gear mounted on the shaft for engagement with the program plate gear segment, a wrapping finger, linkage means connected to the wrapping finger, means for urging the wrapping finger in a first direction and engaged with the linkage, the program cam being operatively associated with the linkage such that the engagement of the linkage with the program plate cam urges the wrapping finger in a second position, and means for intermittently rotating the program plate.

11. Tying apparatus comprising rotatable means for storing and supplying a continuous length of tie material, a rotatable cutting and twisting head for receiving the tie material and twisting it on itself and cutting it from the continuous length supplied, a moveable wrapping finger mounted adjacent said head to receive the tie material and to wrap it around an article to be tied and to be received by said head for twisting and cutting, means for receiving the tie material from said storing means and feeding a preselected length of tie material adjacent said wrapping finger, trigger means mounted to intercept an article to be tied when positioning the article adjacent said head and to be movable therewith, drive means connected to be responsive to the movement of the trigger means towards said head to be actuated thereby for a preselected interval, programming means coupled to said drive means and connected to said feeding means, wrapping finger and cutting and twisting head for operating same in a preselected sequence whereby a portion of tie material is first fed by said head and is partially wrapped around the article to be tied by the wrapping finger and to be simultaneously twisted around the article and cut from the length of the material by said head thereafter, and braking means normally engaging said storing means for preventing the supplying of tie material except during the feeding intervals determined by said programming means.

12. Apparatus for tying bags comprising:

a frame having a bag gathering and receiving groove formed therein,

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a reel rotatively mounted in a vertical position in the frame,
 a length of tie mounted on the reel and extended toward the frame groove,
 a program plate rotatively mounted on the frame, 5 energizable drive means mounted on the frame,
 a clutch mounted with the drive means and the program plate,
 said program plate including a cam, a feeding disc, a plate segment, and a gear segment so mounted on the program plate such that each is effectively only for a 10 portion of the rotation of the program plate,
 a resilient strip mounted on a portion of the feeding disc,
 an idler rotatively mounted on the frame in spaced relation 15 with the feeding disc to be in frictional engagement with the feeding disc strip when rotated thereby the tie material passed therebetween will be advanced upon rotation of the program plate,
 a twister head having an axis of rotation and arcuately 20 shaped arms extending therefrom at right angle to the axis,
 said twister head having a pair of flats formed thereon positioned adjacent to the arcuately shaped arms and disposed closer to the twister head axis than the 25 arms,
 a shear block mounted on the frame,
 a shaft rotatably mounted in the shear block and having the twister head fixedly attached thereon,
 a shear blade slidably mounted upon the shaft and abutting the shear block, 30
 a spring encircling the shaft and acting between the twister head and the shear blade thereby urging the blade to constantly abut the shear block,
 a pinion mounted on the shaft on an extremity extending 35 from the shear block and in alignment with the program plate gear segment,
 a shaft extension extending from the pinion and having a flat thereon which is in spaced relation to the program plate segment during a portion of the rotation 40 thereof and which prevents rotation of the shaft, pinion, shear blade, and twister head,
 the shear block having a passageway therethrough terminating in an opening in spaced relation with the shear blade and in spaced relation with the twister head flats, 45
 a tie guide tube mounted within the shear block passageway,

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the tie extending through the guide tube and the shear block passageway in spaced relation with the shear blade and the twister head,
 a trigger arm pivotally mounted upon the frame extending into the frame groove and abutting a stop formed on the frame,
 a spring engaging the trigger arm and the frame for constantly urging the arm into engagement with the frame stop,
 an L-shaped latch pivotally mounted on the frame and engaging the trigger arm,
 a clutch activating arm pivotally mounted on the frame and fixedly attached to the L-shaped latch and normally engaging the clutch for preventing rotation thereof,
 a spring attached to the frame and engaging the clutch activating arm,
 a wrapping finger pivotally mounted on the frame having a U-shaped portion which encompasses the twister head flats and the bag positioned within the frame groove,
 the wrapping finger having a U-shaped depression formed at the extremity thereof for engaging the tie,
 a T-shaped linkage bar pivotally mounted on the frame and having a portion engageable with the program plate cam,
 a link pivotally mounted to the T-shaped bar and to the wrapping finger, and
 a spring mounted upon the frame and engaging the T-shaped bar such that one portion of the bar will constantly follow the program plate cam.

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