Apparatus and method for applying baling bands around bales of compressible and expandable material in which the band is fed from a band supply in a loop about the bale and in which the leading band end portion is clamped in a position in which it is overlapped by a portion of the band coming from the band supply. The overlapping band portions are formed by die means operated in timed sequence with the band feeding and clamping means with interconnected cut and bend portions, whereafter the loop is cut off from the remainder of the band and the interconnected portions are connected to each other by expansion of the bale.
APPLARATUS FOR APPLYING BANDING BANDS AROUND BALES OF COMPRESSIBLE AND EXPANDABLE MATERIAL.

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for applying banding bands around bales of compressible and expandable material.

Such apparatus is advantageously used in banding presses for compressing artificial or natural fibers into bales and an automatization of the apparatus and the banding press to reduce the number of necessary operators and to assure a quick succession of the necessary steps for applying the banding bands about the compressed bales, is highly advantageous.

In a known apparatus (DT-OS 1,926,292) portions of the doors of the baling press can be opened by hand after compressing the material, and the door portions are replaced by feeding, cutting and connecting means for applying banding bands about the compressed bales. This known apparatus and the method of operating the same will result in a relatively long operating cycle due to the fact that portions of the doors forming the pressure chamber have to be first removed before the band can be applied about the compressed bale. An additional disadvantage of this known arrangement is that the band feeding means have to be constructed that they will not hamper the necessary opening of part of the doors of the baling press, which in turn leads to a complicated construction.

In known apparatus of this type, the bands which are applied about the compressed bales are closed at overlapping ends by sleeves. Thereby it happens, however, frequently that the individual loops formed about the compressed bale have different circumferences so that the bale after expansion of the material surrounded by these loops does not have a uniform cross section.

In order to avoid this disadvantage it has already been suggested to form loose loops of banding bands automatically or by hand about a bale maintained under pressure in a fully closed pressure chamber of the baling press and to connect the ends of the loops or hoops of predetermined circumference manually by means of sleeves or by means of preformed slot connections to each other to obtain thus a bale of uniform cross section after releasing the same from the press. This second mentioned apparatus has, however, the disadvantage to require a great number of operators or a great expenditure of operating time.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an apparatus for applying banding bands around bales of compressible and expandable material which avoid the disadvantages of such methods and apparatus known in the art.

It is an additional object of the present invention to provide an apparatus of the aforementioned kind which is of compact construction and which can be operated expediently and efficiently in a fully automatic manner.

With these and other objects in view, which will become apparent as the description proceeds, the apparatus according to the present invention for applying banding bands around bands of compressible and expandable material mainly comprises means forming a compact pressing chamber and being adapted to receive a bale of such material, feeding means for advancing in a predetermined direction, elongated band to be applied about the bale, guide means on the frame means for guiding the band in a loop about the bale so that the leading end portion of the band will be located in an end position beneath a portion of the elongated band downstream of the feeding means, clamping means for clamping the leading end portion at the aforementioned end position, die means for forming into the leading end portion and the portion of the band superimposed thereon attachable to the connecting means or connecting means for fastening the connecting means to the bale, feeding means which comprise the counter roller or roller against the force of said biasing means.

The aforementioned tool head and the operating means are constructed to form a unit which is releaseably connected to the frame means. In such a construction, if any of the components of the unit should be damaged or excessively worn, the whole unit can quickly and easily be replaced. The connecting means for connecting the unit to the frame means preferably comprise a bearing eye fixed to the frame means and a bearing bolt fixed to the unit and insertable in and removable from the eye and a quick release connection between the unit and the frame means.

In order to quickly adapt the unit for use with baling bands of different thickness and/or width, the unit is preferably provided with band guide means which are adjustable for bands of different thickness and/or width.

The method of applying baling bands about a bale of expandable material mainly comprises the step of placing at least one band in a loop about the bale, forming interconnectable means in overlapping end portions of the bale, and causing permanent connection of the interconnectable means on the overlapping bale end portions by expansion of the bale of expandable material.

If a plurality of baling bands should be applied about a bale it is possible to form a plurality of such loops independently from each other and simultaneously about the bale or to use a single unit which is movable stepwise between a plurality of laterally displaced positions and to apply a plurality of baling bands one after the other to the bale.

The advance of the baling band about the bale, that is the length of each loop to be formed about the bale is preferably controlled by a time switch.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, as to its construction, together with additional objects and
advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING:

FIG. 1 is a partial, partially sectioned side view of the apparatus;

FIG. 2 is a cross section taken along the line II—II of FIG. 1 and drawn to an enlarged scale;

FIG. 3 is a cross-section taken along the line III—III of FIG. 1;

FIG. 4 is a cross section taken along the line IV—IV of FIG. 1;

FIGS. 5a–5e are top views of band end portions formed with various cuts forming means for interconnecting the band end portions to each other;

FIG. 6 is a schematic side view showing the tool head tilted to its releasing position;

FIG. 7 is a schematic partly sectioned overall view of the apparatus according to the present invention;

FIG. 8 is an end view of the apparatus shown in FIG. 7;

FIG. 9 is a partially sectioned side view of the feeding means drawn to an enlarged scale;

FIG. 10 is a partially sectioned detail of the tool head of FIG. 1 and drawn to an enlarged scale;

FIG. 11 is a section through the adjustable guide means located upstream of the feeding means;

FIG. 12 is a detail of the apparatus shown in FIG. 1, drawn to an enlarged scale and showing part of control means for controlling operation of the feeding means, the die means and the cutoff means;

FIGS. 13a and 13b illustrate the arrangement schematically shown in FIG. 6 in further detail; and

FIG. 14 is a cross section through part of the die means and illustrating a device for stripping the punched band portions from the stationary dies.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, and more specifically, to FIGS. 1, 7 and 8 of the same, it will be seen that the apparatus of the present invention comprises a baling press having frame means F forming a compression chamber adapted to receive a bale B of compressible material and the volume of the compression chamber is reducible by means of a movable press plate 52 (FIG. 7) which may be moved in direction of the arrows indicated between a rest position, shown in full lines in FIG. 7, and a compressing position, shown in dotted lines, for compressing the bale B of compressible material. A unit 1, shown in further detail in FIG. 1 and which will be described later on, is mounted of the frame means.

The frame means may be provided with a single unit 1 or with a plurality of such units in a manner as will be described in detail later on.

The band 2 to be applied around the bale B is fed from a coil or band supply, not shown in the drawing, into an inlet funnel 3 (FIG. 1) and is passed after leaving the inlet funnel 3 through guide means 301 of the unit 1 and inbetween the nip of a pair of rollers 4 and 16 of the band feeding means 5. The guide means 301 comprise two members, as shown in FIG. 11, formed with elongated slots extending transverse to the feeding direction of the band 2 and fixable in any adjusted position relative to each other by screws 302 or the like passing through the elongated slots so that the gap between facing guide faces of the two members may be adjusted to accommodate bands of different thickness therebetweent. In order to facilitate feeding of the bands 2 between the nip of the rollers 4 and 16, the counter roller 4 is mounted on the end of a manually operable lever 6 which in turn is tiltable mounted about a tilting axis 601 (FIG. 9) which is arranged eccentrically with regard to the axis of the counter roller 4. The lever 6 is biased by means of spring 8 against an adjustable stop 9 comprising a stop screw 10 with a lock nut 11 so that the distance between the peripheral surfaces of the rollers 16 and 4 may be adjusted depending on the thickness of the band to be fed. By tilting the lever 6 in clockwise direction about its pivot axis 601, the peripheral surface of the counter roller 4 will be moved away against the pressure of the spring 8 from the peripheral, preferably serrated or knurled surface of the roller 16 so that the band 2 may be advanced between the two rollers. The roller 16 is mounted on a shaft 18 and keyed thereto for rotation therewith, and the shaft 18 is turnably mounted in a roller bearing as best shown in FIG. 2. The shaft 18 is driven from a motor 19 provided with a worm gear drive over a chain drive comprising a sprocket wheel 181 mounted on the output shaft of the worm gear drive of the motor 19, a second sprocket wheel 183 keyed to the shaft 18 and a sprocket chain 184 wound about the two aforementioned sprocket wheels. Preferably a third sprocket wheel 183 is provided which engages the sprocket chain 184 between the first-mentioned two sprocket wheels and which is adjustable in direction transverse to the sprocket chain by being mounted on an adjustable mounting member 185, schematically shown in FIG. 9, for keeping the chain in taut condition. The band 2 fed by the feeding means 5 is passed downstream of the feeding means 5 over an upper guide face 21 of a cutoff knife 20, as best shown in FIGS. 3 and 10, and subsequently thereto between a plurality of stationary lower dies 28 and a plurality of movable upper dies 14 adapted to cooperate with the stationary dies to form in the band connectable means in the manner as will be described later on. As shown in FIGS. 4 and 14 lateral adjustable guide means 121 are provided in the region of the stationary die 38 for guiding lateral edges of the band 2 edges proper relation to the upper and lower dies. The guide means 121 are adjustable to properly position bands of different widths in proper relation to the dies. Subsequent to the die means the band is passed in a loop through a channel system incorporated into the frame means F and comprising a plurality of curved guide portions 13 arranged at the corners of the frame means until the leading band end portion 15 is passed between a bottom face or clamping face 24 of the cutoff knife 20 and the opposite end face of an abutment in the form of a screw 34 which is adjustable in direction toward and away from the clamping face 24 and between the lower and upper dies 38 and 14, so that the leading end portion 15 of the band is overlapped, as shown in FIG. 10, by the band portion fed by the feeding means 5. After the leading band portion 15 has reached the position as shown in FIG. 10, the band end portion 15 is...clamped between the clamping face 24 of the cutoff knife and the opposite face of the abutment 34, whereas after the drive motor 19 is reversed, in a manner as will be described later on, so that the rotation of the feed roller 16 is likewise re-
versed whereby the baling band 2 is pulled out of the channel system and brought into engagement with three sides of the bale 3 to form a not yet closed hoop of predetermined circumference about the bale. The circumference of the hoop is determined during the advancing movement of the feed means as well as during the return movement thereof preferably by a time switch, however, it is also possible to provide instead of a time switch a length measuring device having rollers engaging the band during the feeding in the one and the other direction thereof.

The upper dies 14 are fixed to lower ends of punches 39 which are biased to a rest position spaced from the opposite stationary dies 38 by compression springs 22, one of which is best shown in FIG. 4, and they are moved from the rest position to an active position cooperating with the dies 38 by a plurality of eccentrics 35–37 mounted spaced from each other on a shaft 27 which is connected by a spline coupling 28 to the output shaft of a motor 26. The eccentrics 35–37 cooperate with rollers 40 mounted respectively on the upper ends of the punches 39 to move the latter one after the other to their active position upon rotation of the output shaft of the motor 26 and the shaft 27 connected thereto for simultaneous rotation.

The cutting knife 20 is mounted on a bolt 20' (FIG. 3) for tilting movement and is urged by a compression spring 32 and a plunger 32' sandwiched between the lower end of the compression spring and the right end, as viewed in FIG. 3, of the upper face 21 of the cutoff knife 20 to tilt in clockwise direction. During the feeding of the band 2 and the leading end portion 15 thereof between the clamping face 24 of the cutoff knife 20 and the opposite face on the set screw 34, such tilting of the cutting knife 20 under the action of the compression spring 32 is, however, prevented by a lever 31 projecting upwardly from the left end, as viewed in FIG. 3, of the cutting knife 20 and cooperating with a plunger 30 carrying a roller 30' on its right end, as viewed in FIG. 3, and cooperating with a cam curve 29 on the left end, as viewed in FIG. 1, of the shaft 27, in a manner as will be described later on. The right end face, as viewed in FIG. 10, of the cutoff knife 20, intersects the guide face 21 thereof to form a cutting edge 42 adapted to cooperate with a cutting edge 41 forming at a face adjacent the right end face of the cutting knife on the leftmost upper die 14, as viewed in FIG. 10. The set screw 34 cooperating with the clamping face 24 of the cutoff knife 20 is adjustable screwed into a substantially C-shaped support for the lower dies 38 and its endface facing the clamping face 24 is preferably hardened and knurled so as to assure a better clamping of the leading end band portion 15 between the clamping face 24 and the end face of the set screw 34.

The feeding means 5 comprising the rollers 4 and 16 and the drive means for driving the roller 16, the cutoff knife 20 and the elements cooperating therewith for clamping the leading end portion 15 of the band, as well as the die means comprising the punches 39, the upper dies 14, the stationary dies 38 and the support 33 for supporting the stationary dies and the clamping screw 34 are connected to each other to form a tool head 12 which is tiltable about a tilting axis 45 by means of a bearing 44 coaxial with the shaft 27 and a second bearing 43 aligned axially spaced with the bearing 44, between an active position as shown in FIG. 13a and a releasing position as shown in FIG. 13b. To tilt the tool head 12 between the two positions as shown in 13a and 13b, a pneumatic cylinder 46 is provided, in which a piston is reciprocable and the piston rod 461 is connected to a guide block 462 which is formed with an inclined groove 463 in which a roller 464 turnably mounted on an arm 123 projecting upwardly from the tool head 12 is guided so that as the piston in the pneumatic cylinder 46 moves upwardly from the position shown in FIGS. 13a, the tool head 12 is tilted from the active position as shown in FIG. 13a in which it abuts against a stationary member 51 to the tilted position, as shown in FIG. 13b, in which it releases the loop formed by the connected ends of the baling band from the tool head.

The lower dies 38 and the movable upper dies 14 are constructed in a known manner to punch during movement of the punches 30 to their active position pairs of slits 51 of single slits 52 or double pairs of slits 53, as shown in FIGS. 5a–5e, into the overlapping portions of the baling band and to bend portions of the overlapping band portions adjacent to the slits out of the plane of the band portions to form connectable portions on the overlapping band portions which may be connected to each other by pulling the overlapping band portions in opposite directions. Such connecting portions in baling bands are well known in the art as for instance disclosed in the patent to Timmerbeil et al., U.S. Pat. No. 3,234,610. The slits shown in FIGS. 5a–5e are given only by way of examples and evidently different slits may also be formed in the overlapping baling band portions to subsequently connect the same to each other. Since during forming of the slits into the overlapping band portions the latter tend to stick to the dies 38, after the punches move back to their upper rest position, at least one or a plurality of strippers 47, as best shown in FIG. 14, are provided to strip to the overlapping baling band portions tending to stick to the dies 38 from the latter. The stripper 47 is spring loaded and assumes when the upper dies 14 connected to the punches 39 move to the upper dies 14 connected to the punches 39 move to the lower active position, the position as indicated at 471 in dotted lines in FIG. 14, whereas when the punches move upwardly to their rest position, the spring loaded member will move upwardly and engage lateral portions of the overlapping band portions on the dies 38 to strip the band portions from the dies. As also shown in FIG. 14 each of the upper dies 14 is provided with a cutout 122 to prevent interference with the lateral guides 121, adjustably mounted in the base plate for the lower dies 38 for guiding the edge portions of the overlapping baling band portions.

As further shown in FIG. 1, the tool head 12 including the feeding means 5 and the drive motor 19 for the latter, as well as the drive motor 26 for driving the shaft 27, the inlet funnel 3 and the guide means 301 and the pneumatic cylinder 46 for tilting the tool head 12 between the two positions as described above are combined into a unit 1 which is releasably mounted on the frame of the apparatus. For this purpose, an eye 48 is fixedly connected to the frame into which a transverse pin 49 connected to the right end of the unit 1, as viewed in FIG. 1, is releasably engaged, whereas a quick release connection 50 engages the other end of the unit so that by opening the quick release connection 50, the pin 49 may be pulled out of the eye 48 and
the whole unit be quickly removed from the apparatus to be replaced, if necessary, by a new unit.

The above-described apparatus will be operated in a fully automatic manner as follows:

At the start of the operation, the bale B is compressed by moving the platen 52 inwardly to the position as shown in dotted lines in FIG. 7. Lever 6 is manually operated to move the counter roller 4 away from the feed roller 16 so that the leading end of the baling band 2 may be fed by hand into the space between the peripheral surfaces of the rollers, whereafter the lever 6 is released so that the spring 8 moves the counter roller 4 toward the feed roller 16 thereby clamping a portion of the baling band 2 between the peripheral surfaces of the rollers. Subsequently thereto, the drive motor 19 for the feed means 5 is started so that the band is fed through the guides provided over the guide face 21 of the cutting knife, through the space between the upper die 14 and the lower dies 38 to be subsequently guided by the additional guide means 13 in a loose loop about the compressed bale, until the leading end portion 15 of the band passes through the channel 23 and beneath the clamping face 24 of the cutting knife into the space between the upper dies 14 and the lower dies 38 to an end position as shown in FIG. 10.

The length of the feeding time and, therefore, the circumference of the thus formed loop is determined by a time switch TS which may be mounted on the motor 19 or in any other position and which is set to stop the motor 19 when the leading end portion 15 of the baling band reaches the position as shown in FIG. 10.

The time switch TS, while stopping the motor 19, starts at the same time the motor 26 which drives the shaft 27 so that the latter turns through an angle of 15°. During such turning of the shaft 27 the cam portion 29 (FIG. 3) on the left end of the shaft 27, as viewed in FIG. 1, permits inward movement of the plunger 30 so that the cutting knife 20 is tilted by the action of the compression spring 32 in clockwise direction, clamping thereby the leading end portion 15 of the band between the clamping face 24 of the cutting knife and the opposite face of the set screw 34. After the shaft 27 has turned through an angle of 15°, the motor 26 is energized by means of a switch 281 (FIG. 12) in circuit therewith which is operated by an arcuate cam 282 fixed to the shaft 27 for rotation therewith and at the same time, this switch energizes the motor 19 in reverse direction so that while the leading end portion 15 of the baling band is clamped, the baling band is pulled back to now engage the bale on three sides thereof and to form a loop of predetermined circumference. The withdrawal of the band in reverse direction is controlled by a second time switch, not shown in the drawing. This second time switch stops the motor 19 and simultaneously reenergizes the motor 26 so that the shaft 27 completes its full revolution during which the eccentrics 35–37 on the shaft 27 operate the upper dies 14 so that the connecting portions comprising the slits and bends in the overlapping band portions between upper dies 14 and the lower dies 38 are formed.

At the same time, the cutting edge 41 on the leftmost upper die 14, as viewed in FIGS. 1 and 10, cooperates with the cutting edge 42 on the cutting knife 20 to sever the upper band portion from the remainder thereof.

The turning of the shaft 27 through a full revolution is terminated by an additional switch 282, likewise cooperating with a cam curve on the shaft 27, which de-

energizes again the motor 26 and which simultaneously operates a valve, not shown in the drawing, and connected to the pneumatic cylinder 46 to cause movement of the piston rod 461 in upward direction to the position shown in FIG. 13b causing thereby tilting of the tool head 12 from the position as shown in FIGS. 13a to the position as shown in FIG. 13c so that the baling band about the bale is released from the space between the dies.

Tilting of the tool head 12 causes operation of a switch 511 (FIGS. 13a and 13b) which causes movement of the press platen 52 so that the compressed bale B may expand. Such expansion of the bale causes a slight movement of the overlapping band portion in opposite directions so that the connecting portions formed in the overlapping band portions are permanently connected to each other in a known manner. During movement of the press platen 52 an end switch, commonly provided on presses and not shown in the drawing, is actuated which cooperates with the above-mentioned valve connected to the pneumatic cylinder 46 to operate the latter so that the tool head 12 is moved back to its working position as shown in FIG. 13a. Since during tilting of the tool head 12 between the two positions as shown in FIGS. 13a and 13b, the inlet funnel 3 tilts with the tool head, one side of the funnel 3 is, in a manner not illustrated in the drawing, resiliently connected. In this way a twisting and possible deforming of the baling band 2 is prevented which would otherwise detrimentally affect the next baling operation.

Usually it will be necessary to provide a plurality of baling bands about the compressed bale and for this purpose a plurality of channels 56 are formed in the press platen 52 and the opposite stationary press platen, as shown in FIG. 8. The tool head 1 may be mounted on a carriage 54 movable in transverse direction on guide rods 53 by means of a drive 55, schematically indicated in FIG. 8, between a plurality of positions respectively aligned with the channels 56 so that the plurality of baling bands may be successively applied in the aforementioned manner about the bale. On the other hand, it is also possible to provide the apparatus with a plurality of units 1 respectively aligned with the channels 56 so that the plurality of baling bands may be applied simultaneously about the bale. Since all the hoops formed by the baling bands about the bale will have by the means described above exactly the same circumferential length, the bale after expansion will have substantially uniform cross section as is required for instance in connection with container packaging. After the hoops have been applied about the bale, the compression chamber is opened and the bale ejected.

By exchange of a tool head 12 against another one it is quickly possible to adapt the apparatus for use with baling bands provided with different kinds of connecting means or for baling bands of different material, for instance, of plastic material. The above-described unit 1 according to the present invention has the advantage that it is possible to apply the connection in the plane of compression where the load on the connection member is less than at side faces of the bale.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of apparatus for applying baling bands around bales of compressible and
expansible material differing from the types described above.

While the invention has been illustrated and described as embodied in apparatus for applying baling bands around bales of compressible and expansible material in which the means for feeding the band, for cutting the same, and for forming connectable portions in overlapping band portions are combined into a unit releasably connected to the frame of the apparatus, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims:

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claim:

1. Apparatus for applying baling bands around bales of compressible and expansible material comprising frame means forming a compression chamber and being adapted to receive a bale of said material; feeding means for advancing an elongated band to be applied to the bale in a predetermined direction; guide means on said frame means for guiding the band in a loop about the bale so that the leading end portion of the bale will be located in an end position beneath a portion of said band downstream of said feeding means; clamping means for clamping said leading end portion of said band at said end position; die means for forming into said leading end portion and the portion of the band superimposed thereto interengageable means for connecting said band portions; cutoff means for cutting off the superimposed band portion from the remainder of the band; means for operating said feeding means, said clamping means, said die means, and said cutoff means in proper sequence, the means operated by said operating means being connected into a tool head, and mounting means mounting said tool head tiltably about a tilting axis between an active position and a releasing position releasing the connected portions of the band from said tool head.

2. Apparatus as defined in claim 1, wherein said feeding means comprise a feed roller connected to said operating means to be driven thereby, a counter roller opposite said feed roller, resilient means for biasing said counter roller towards said feed roller, and means for moving said counter roller against the force of said biasing means away from said feed roller for threading the band between the rollers.

3. Apparatus as defined in claim 1, wherein said operating means comprise a motor having an output shaft, a second shaft coupled to said output shaft, and eccentric means fixed to said second shaft for rotation therewith and cooperating with said die means for operating the latter.

4. Apparatus as defined in claim 3, wherein said die means comprise a plurality of adjacent stationary lower dies and a plurality of adjacent upper dies cooperating with said lower dies and each movable between a rest position and an active position, said eccentric means comprising a plurality of eccentrics on said second shaft for moving, during rotation of the latter, said upper dies from said rest position to said active position, and biasing means biasing said upper dies to said rest position.

5. Apparatus as defined in claim 4, wherein said cutoff means comprise a cutoff knife having a face providing a cutting edge extending transverse to the direction at which said band is fed, and said plurality of upper dies comprise a first upper die adjacent said cutoff knife and having a face closely adjacent said face of said cutoff knife and providing a second cutting edge cooperating with that of the knife for cutting off the superimposed band portion from the remainder of the band during movement of said first upper die to said active position.

6. Apparatus as defined in claim 5, wherein said cutoff knife is tilttable in a direction transverse to the feeding direction and wherein said clamping means comprise a clamping face on said cutoff knife extending in said feeding direction and stationary means opposite said clamping face for clamping said leading end portion of the band between said clamping face and the stationary means during tilting of said cutting knife in a clamping direction in which said clamping face moves towards said stationary means.

7. Apparatus as defined in claim 6, and including means for tilting said cutoff knife in said clamping direction and comprising resilient means biasing said cutoff knife in said clamping direction, a cam curve on said second shaft, and transmission means between said cam curve and said cutoff knife for normally holding said clamping face spaced from said stationary means while permitting said cutoff knife to tilt under the influence of said biasing means cooperating therewith to said clamping position upon turning of said second shaft through a given angle.

8. Apparatus as defined in claim 7, wherein said stationary means is adjustable toward and away from said clamping face.

9. Apparatus as defined in claim 3, wherein said operating means comprise a second motor cooperating with said feeding means.

10. Apparatus as defined in claim 9, and including control means for actuating and deactivating the first mentioned and said second motor in timed sequence.

11. Apparatus as defined in claim 10, wherein said control means comprise a time switch cooperating with said second motor and a pair of switch means actuated in dependency on the rotation of said first motor.

12. Apparatus as defined in claim 1, wherein said operating means comprises a first motor having an output shaft and drive means connected to said output shaft for operating said die means and a second motor connected to said feeding means for driving the latter, said tool head including said second motor being tiltable between said active and said releasing position around the axis of said output shaft.

13. Apparatus as defined in claim 12, and including means connected to said tool head for tilting the latter between said active and said releasing position.

14. Apparatus as defined in claim 13, and including control means for actuating and deactivating said first and said second motor, said control means cooperating also with said means for tilting said tool head in se-
11. Apparatus as defined in claim 1, wherein said tool head and said operating means form a unit and including means for releasably connecting said unit to said frame means.

15. Apparatus as defined in claim 1, wherein said tool head and said operating means form a unit and including means for releasably connecting said unit to said frame means.

16. Apparatus as defined in claim 15, wherein said connecting means comprise a bearing eye fixed to said frame means and a bearing bolt fixed to said unit and insertable in and removable from said eye, and a quick release connection between said unit and said frame means.

17. Apparatus as defined in claim 15, and including means on said frame means for mounting said unit movable in a direction transverse to said feeding direction between a plurality of positions, and means cooperating with said unit for moving the latter in said transverse direction between said plurality of positions for successively placing a loop on the bale in each of the positions of said unit.

18. Apparatus as defined in claim 1, and including further guide means upstream of said tool head, said further guide means being adjustable for accommodating bands of various thickness.

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