Nov. 7, 1950 L. J. R. SANDERS 2,529,313

MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Filed Nov. 20, 1948 12 Sheets-Sheet 1

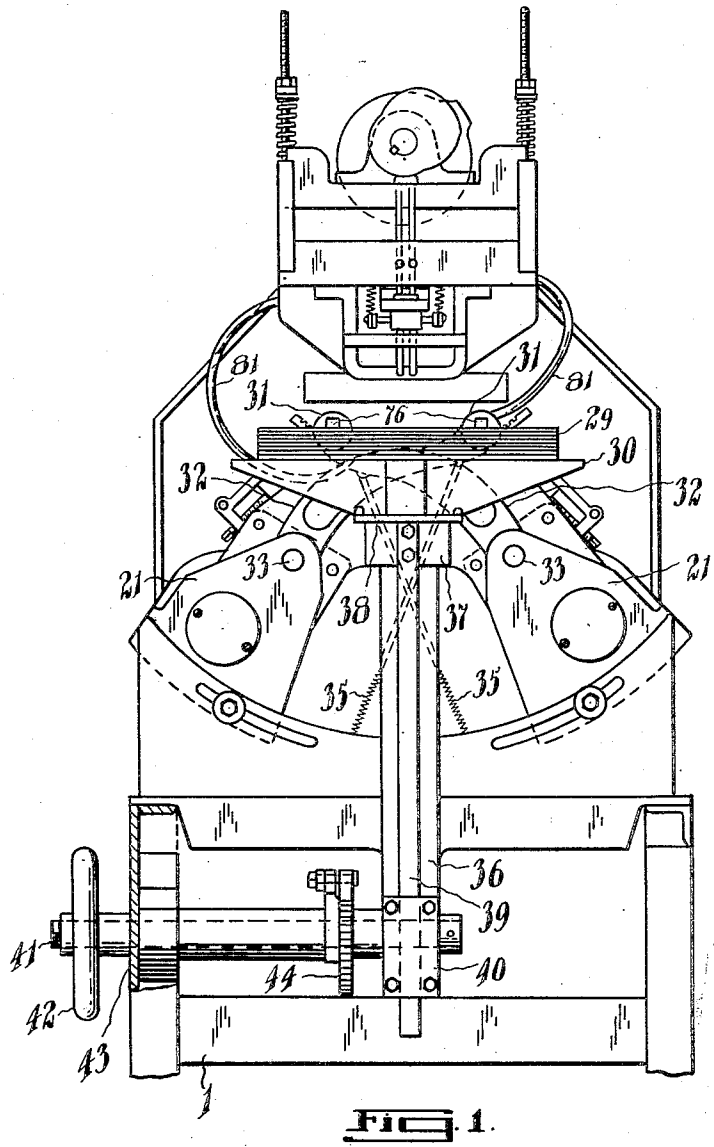



Fig. 1.

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Nov. 7, 1950 L. J. R. SANDERS 2,529,313

MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Filed Nov. 20, 1948 12 Sheets-Sheet 2

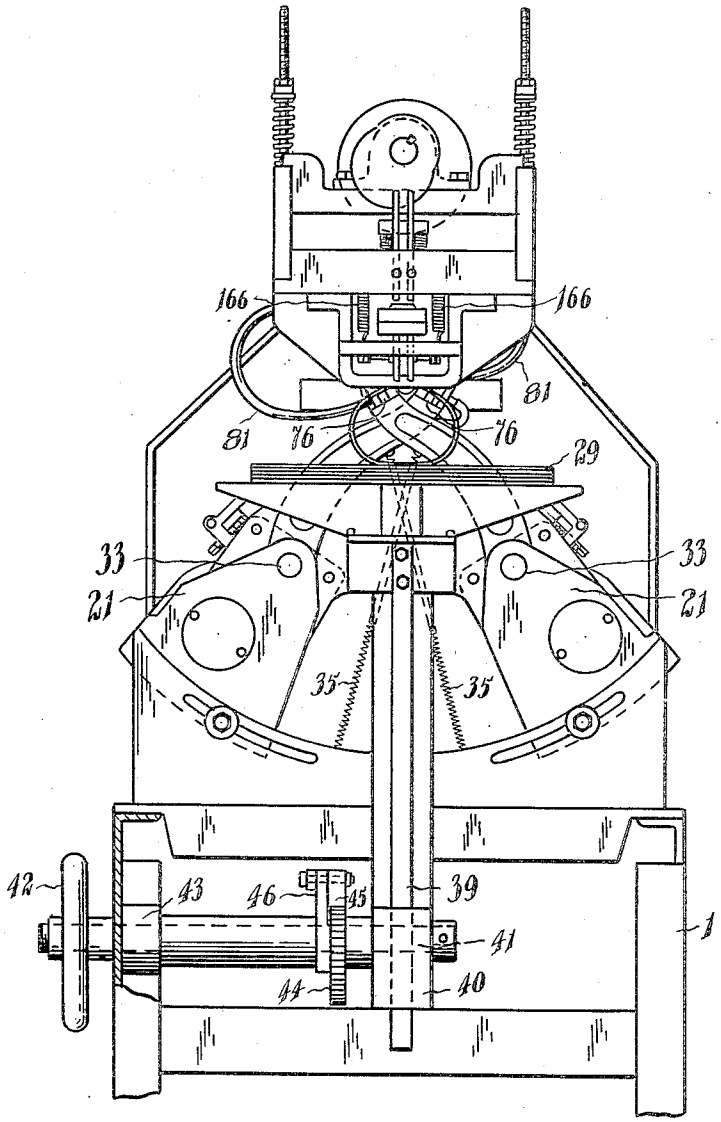



Fig. 2.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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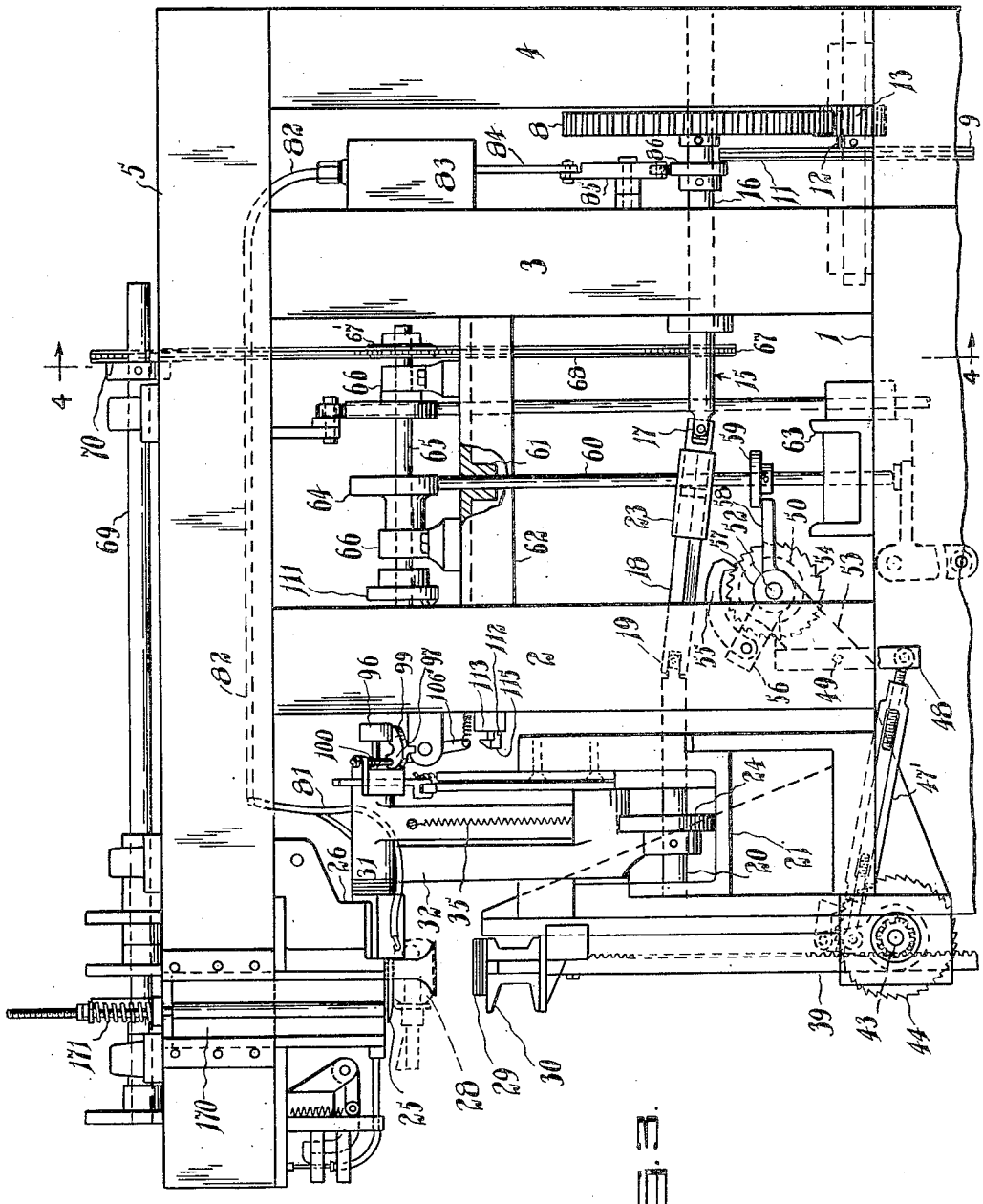


Fig. 3.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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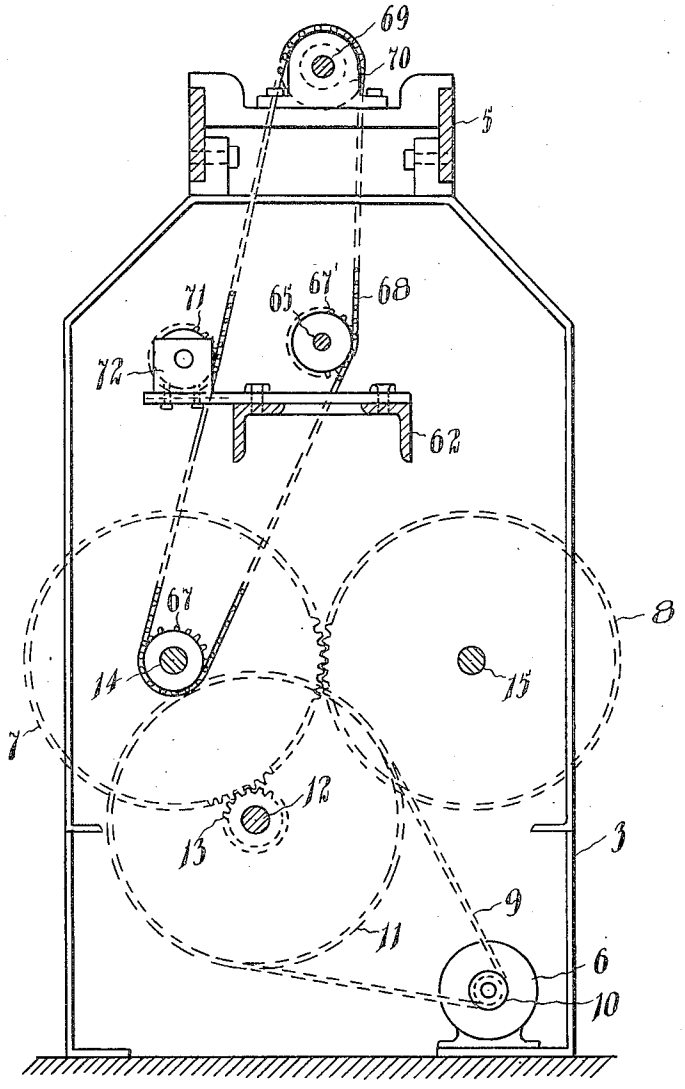



Fig. 4.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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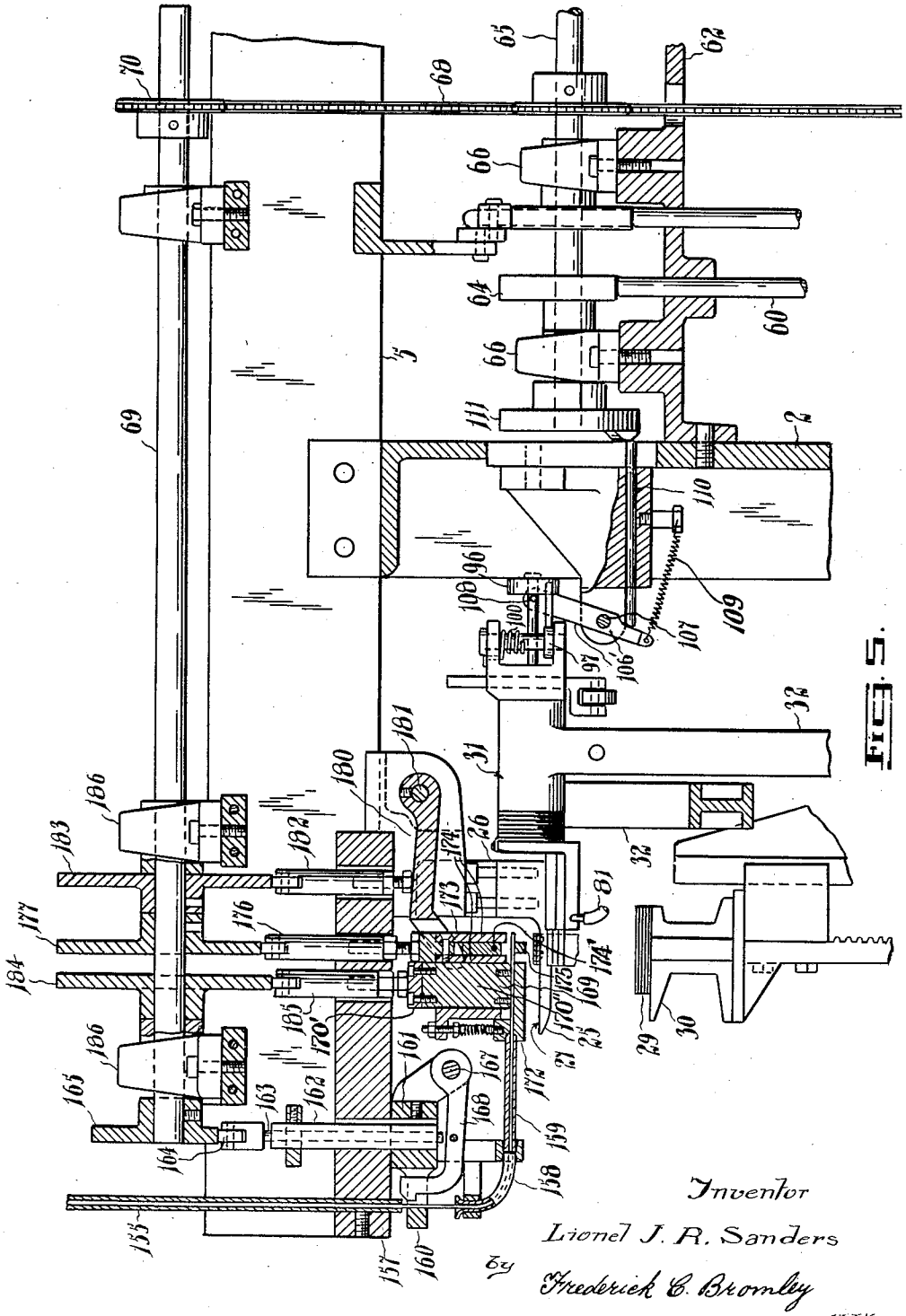


FIG. 5.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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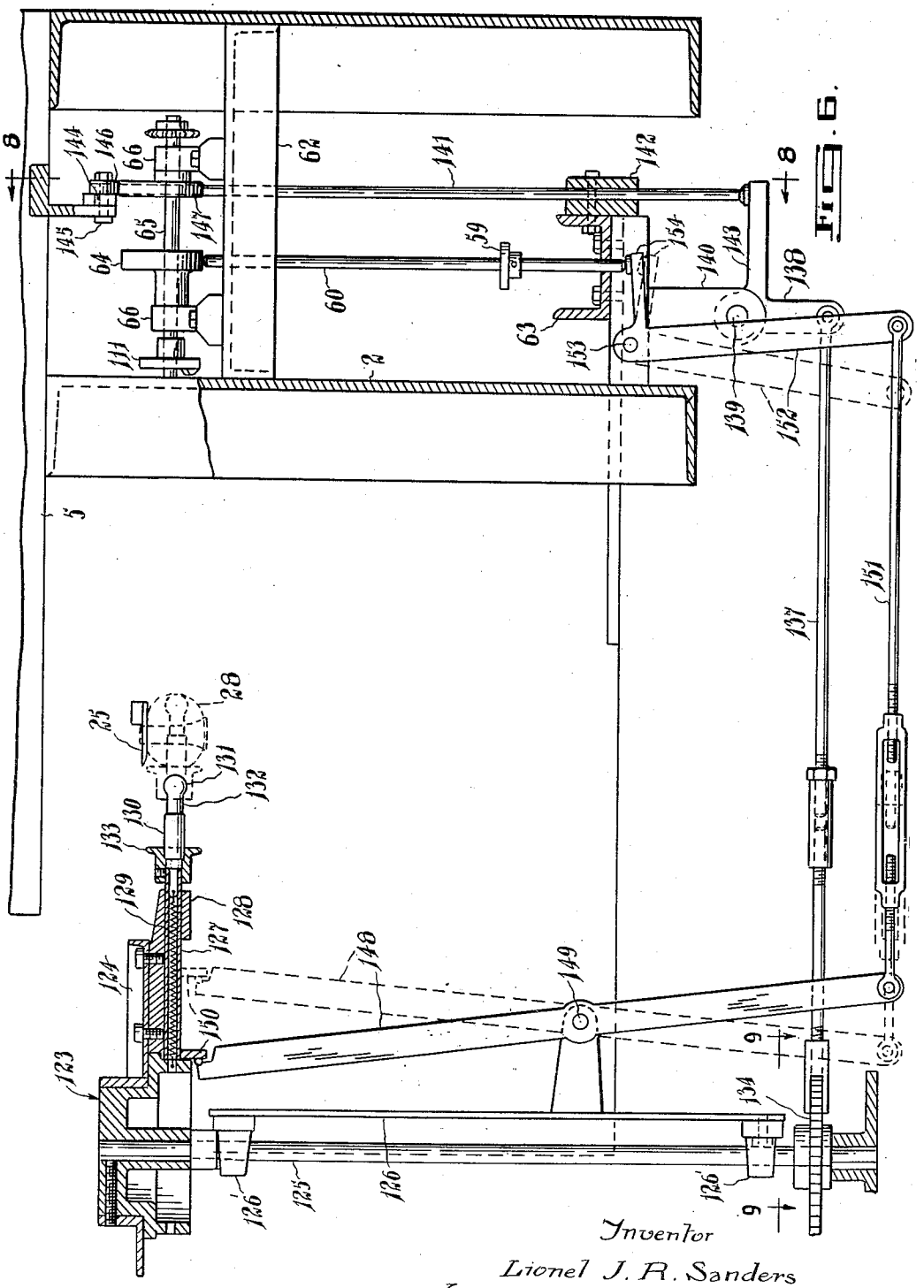



FIG. 6.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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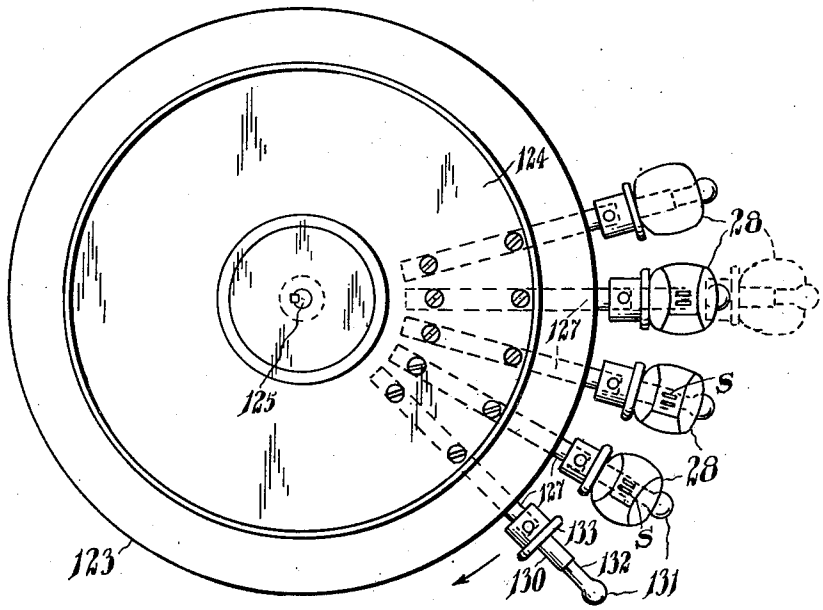



Fig. 7.

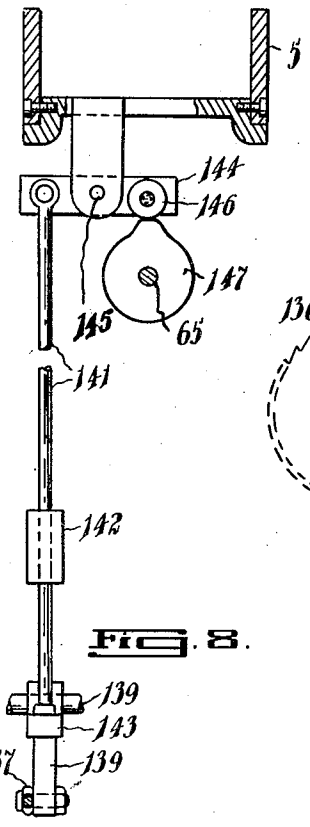



Fig. 8.

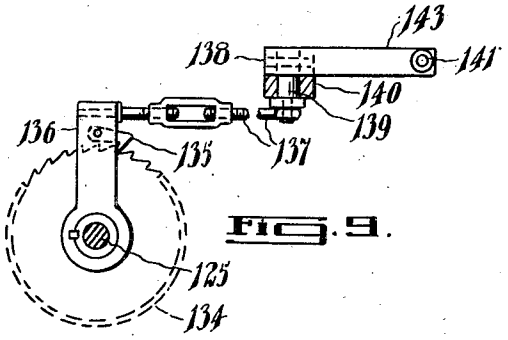



Fig. 9.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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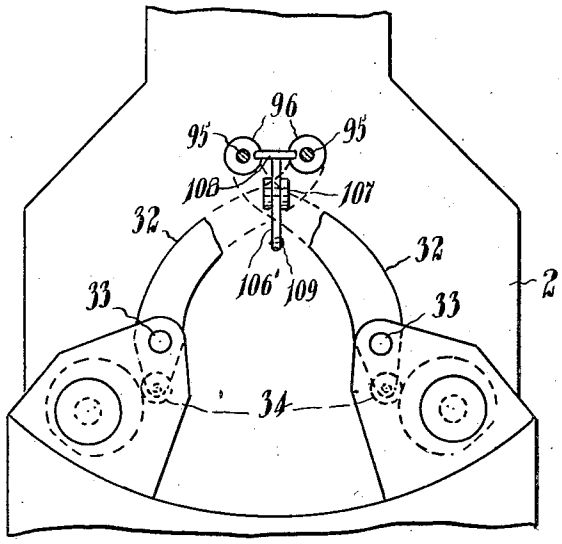



Fig. 14.

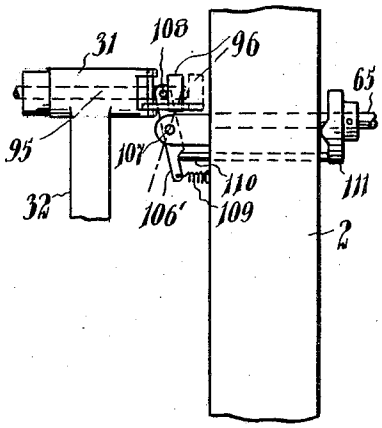



Fig. 15.

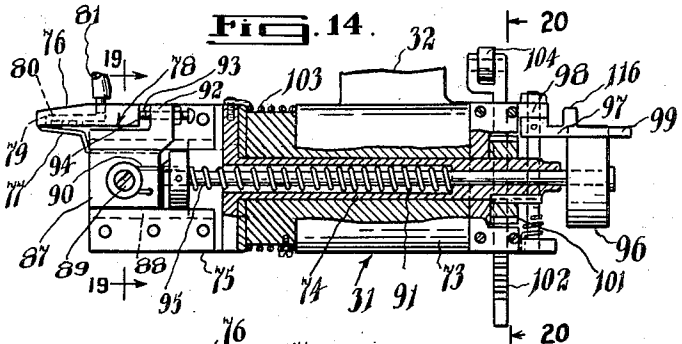



Fig. 18.

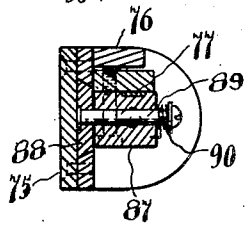



Fig. 19.

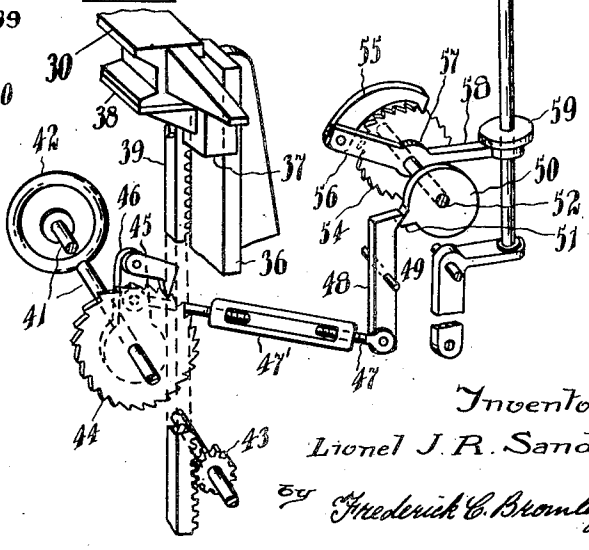



Fig. 10.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Filed Nov. 20, 1948

12 Sheets-Sheet 9

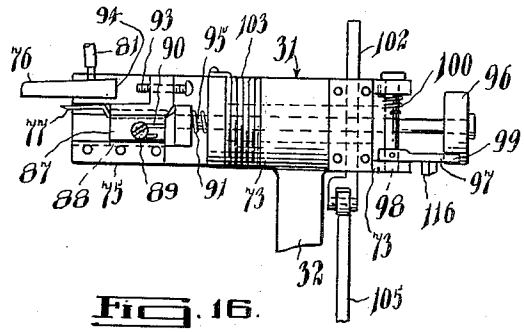



Fig. 16.

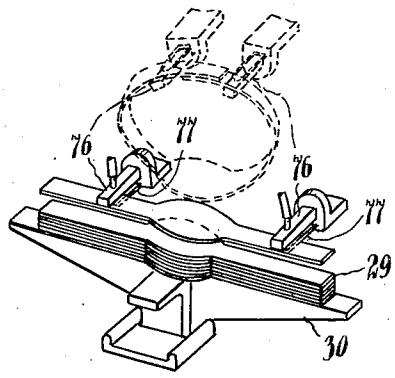



Fig. 11.

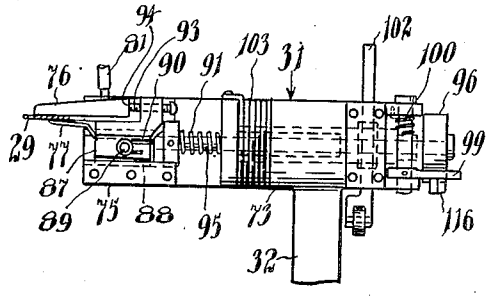



Fig. 17.

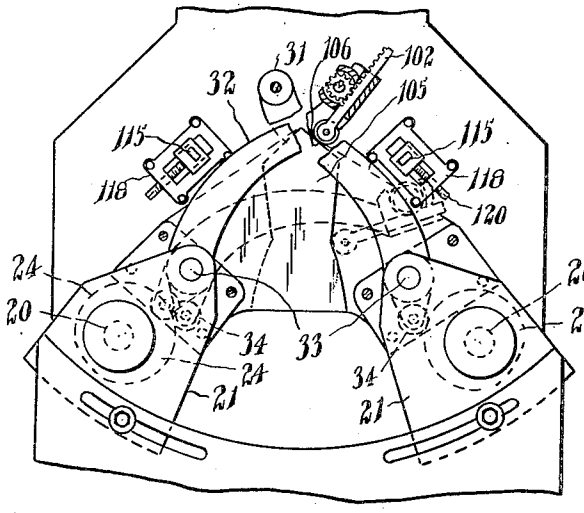



Fig. 12.

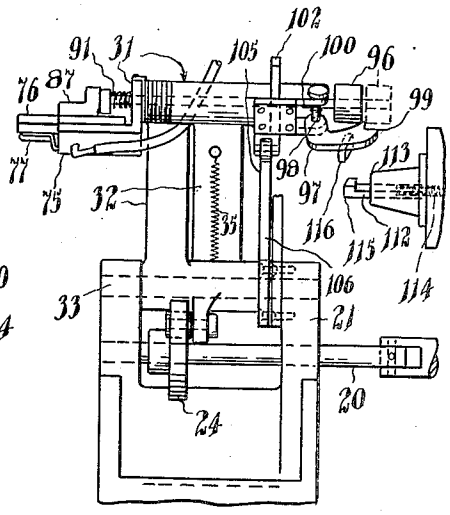



Fig. 13.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

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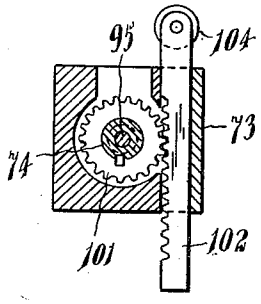



FIG. 20.

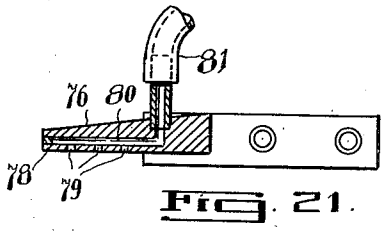



FIG. 21.

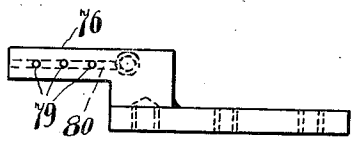



FIG. 22.

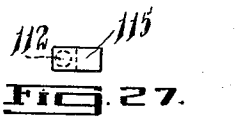



FIG. 27.

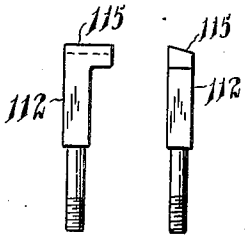



FIG. 25 FIG. 26.

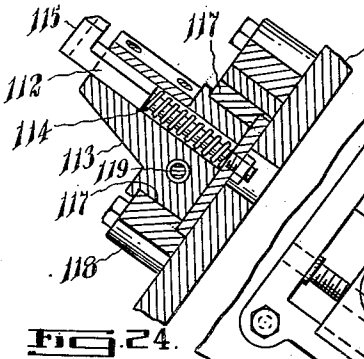



FIG. 24.

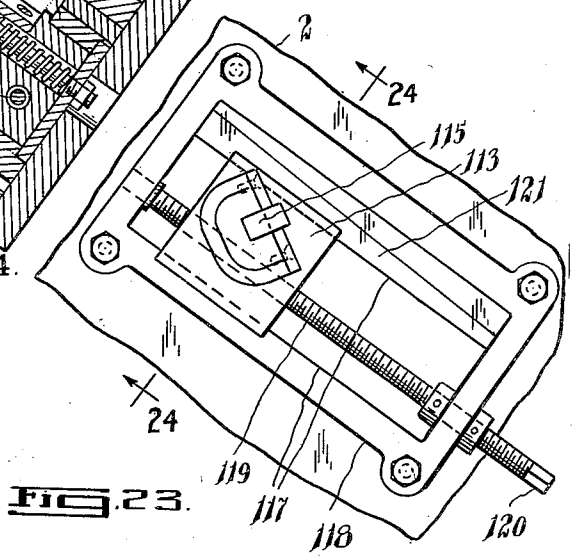



FIG. 23.

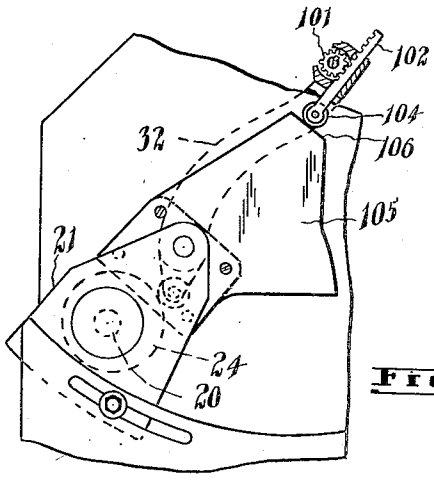



FIG. 15.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Filed Nov. 20, 1948 12 Sheets-Sheet 11

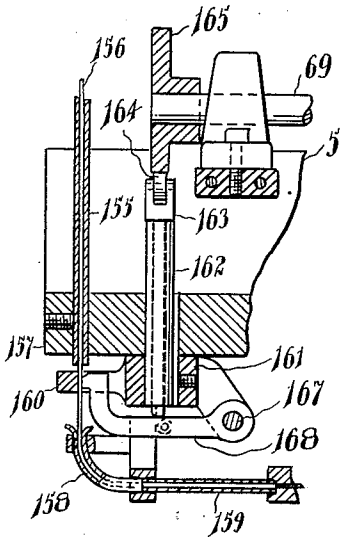



FIG. 30.

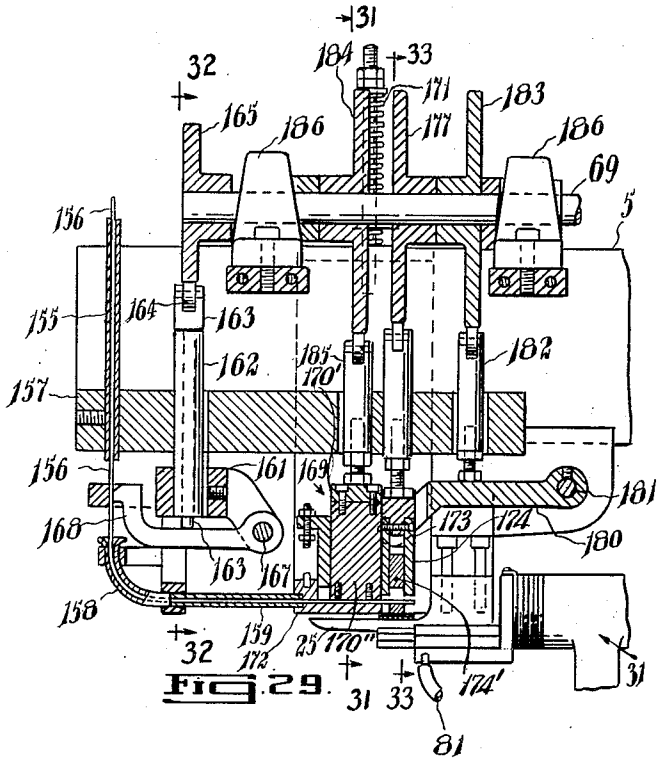



FIG. 29.

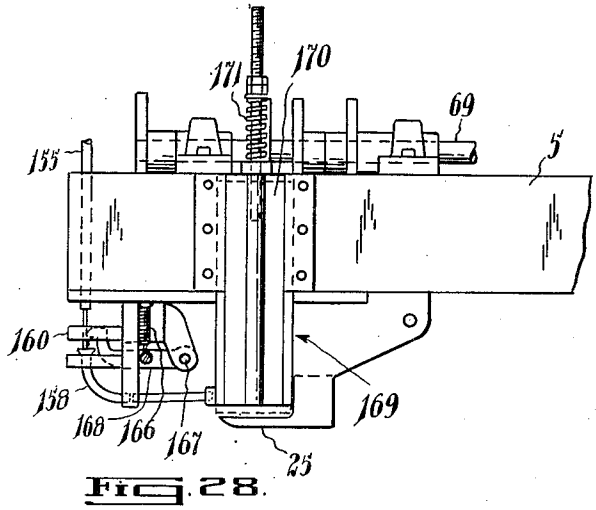



FIG. 28.

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MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Filed Nov. 20, 1948 12 Sheets-Sheet 12

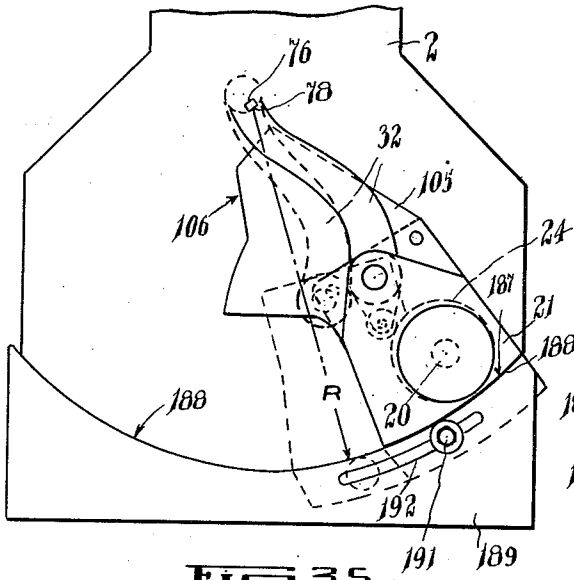



FIG. 35.

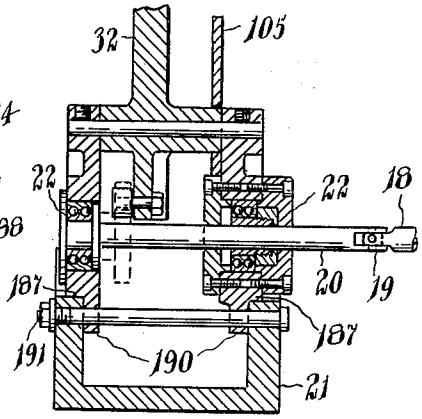



FIG. 36.

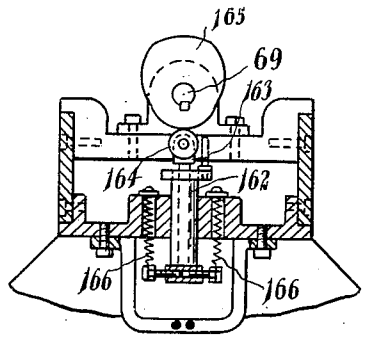



FIG. 32.

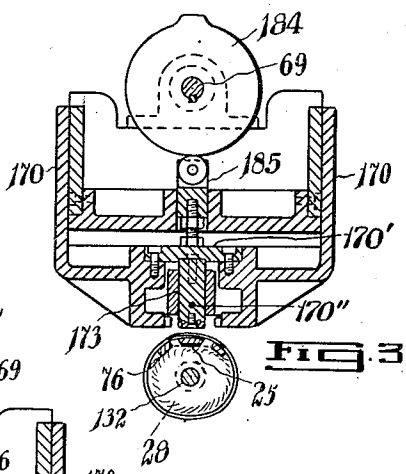



FIG. 31.

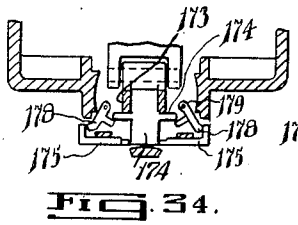



FIG. 34.

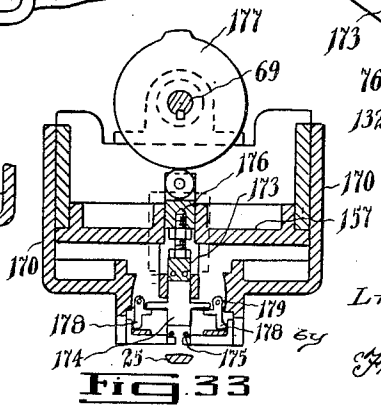



FIG. 33

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Patented Nov. 7, 1950

2,529,313

# UNITED STATES PATENT OFFICE

2,529,313

## MACHINE FOR PUTTING BANDS ON BALLS OF KNITTING WOOL

Lionel J. R. Sanders, Galt, Ontario, Canada

Application November 20, 1948, Serial No. 61,161

34 Claims. (Cl. 1—2)

1

The invention pertains to automatic machinery and in particular to a machine especially devised to attach the usual paper band to a ball of knitting wool.

In current practice such a band has a gummed end by which its ends are secured together when it has been wrapped about a ball of wool by a manual operation. The manual application of such bands is a slow and costly method.

The machine of the present invention automatically applies the bands to the balls in a continuous operation and staples the ends in lieu of the customary adhesive attachment.

The machine includes a fixed anvil below which is a table for supporting bands. A stack of the bands is placed on the table by hand and the balls are placed by hand on holders of a rotary conveyor, which conveyor feeds the balls one at a time directly below the anvil where each is momentarily stationed while a band is applied. Pick-up devices operate to lift a band from the top of the stack and bend it around a stationed ball with its ends overlapping and overlying the anvil for a stapling operation. The pick-up devices comprise crossed arms pivoted to swing under the influence of cams. The arms carry heads which are caused to travel arcwise between the top of the stack and the anvil. The heads are provided with gripping fingers, there being a pair on each head. One of each pair is a suction finger which initially pneumatically takes hold of an end of the top band of the stack when the heads are in a fully lowered position and in this way lifts the band jointly with the corresponding finger of the other head. While the heads are being swung upwardly toward the anvil the pairs of fingers are turned with a wrist movement for flexing the band around the ball, and in the upward swing of the heads the ends of the band are gripped by the non-suction fingers which are in the form of resilient members that are projected and closed against the respective suction fingers to clamp the band ends in lieu of the suction hold, which is then cut off. In the fully raised positions of the heads the fingers are located in close proximity to the anvil and when the ends of the band have been stapled together the resilient fingers are retracted from the inner side of the band so that the banded ball can be removed by the conveyor. The stapling is performed by a stapling mechanism that forms the staples as they are required. The staples are clinched by the anvil as they are driven through the ends of the band. Since the pick-up devices have a set swing the level of the stack must be maintained within close limits in order that the band which is uppermost may be picked up by the suction fingers. To meet this requirement the table is elevated from time to time to compensate for bands removed from the stack.

2

The moving components of the machine are co-ordinated in proper sequence of operation and cams are largely employed as the motivating agents of the components. The machine is adjustable for bands of different lengths and it has been demonstrated that the machine is capable of attaching bands in an efficient manner for assuring a large output in a time and labor saving production.

A machine constructed in accordance with the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a front view of the machine showing the pick-up devices in lowered position for lifting the top band of a stack.

Fig. 2 is a similar view but showing the pick-up devices raised and turned to wrap the band about a ball of wool with the ends of the band overlapped and positioned over the anvil for stapling.

Fig. 3 is a side elevation of the machine with the pick-up devices raised as in Fig. 2.

Fig. 4 is a vertical cross section through the machine taken on line 4—4 of Fig. 3.

Fig. 5 is a longitudinal section through the upper part of the machine depicting the cam mechanism for the pick-up devices and the stapling mechanism.

Fig. 6 is a sectionized view taken longitudinally of the machine to show the cam actuating mechanism for the rotary conveyor for balls of wool.

Fig. 7 is a top plan aspect of the head of the rotary conveyor.

Fig. 8 is a vertical section of the cam mechanism for turning the head of the rotary conveyor.

Fig. 9 is a section taken substantially on line 9—9 of Fig. 6 to illustrate more clearly the ratchet device which forms a part of the cam mechanism for turning the head of the rotary conveyor.

Fig. 10 is a perspective view of the mechanism for automatically elevating the table which supports the stack of bands.

Fig. 11 is a perspective view showing a stack of bands supported on the table and the top band lifted by the pick-up devices. There is also indicated in this view, in dash lines, the fully raised positions of the pick-up devices with said top band curled into a ring with its ends overlapped ready for stapling.

Fig. 12 is a fragmentary front view of the machine depicting the swingable arms, which carry the pick-up devices, and the stationary cams which effect the turning of the pick-up devices.

Fig. 13 is a substantially side elevation of Fig. 12.

Fig. 14 is a fragmentary front aspect of the swingable arms and the cams by which they are operated.

Fig. 15 is a side view of Fig. 14.

Fig. 16 is a side elevation of one of the heads of the pick-up devices showing the band gripper in open position.

Fig. 17 is a similar elevation but showing the band gripper closed on an end of a band.

Fig. 18 is a further side elevation of one of the heads of the pick-up devices, but showing parts broken away to disclose the interior construction.

Fig. 19 is a cross section on line 19—19 of Fig. 18.

Fig. 20 is a cross section on line 20—20 of Fig. 18 depicting a cam follower rack for turning the gripper fingers of said head.

Fig. 21 is a sectionized longitudinal view of the relatively fixed finger of said head.

Fig. 22 is an inner side view thereof.

Fig. 23 is a detail in elevation of an adjustable trip device for release of the movable finger of the pick-up devices.

Fig. 24 is a cross section on line 24—24 of Fig. 23.

Figs. 25 and 26 are detailed views in side elevation of the tripping finger of said trip device.

Fig. 27 is an end view of the tripping finger which is detailed in Figs. 25 and 26.

Fig. 28 is a side elevation of the stapling head.

Fig. 29 is a longtudinal section through the stapling head showing it in lowered position for a stapling operation.

Fig. 30 is a similar but fragmentary view of the stapling head in raised position.

Fig. 31 is a vertical cross section taken on line 31—31 of Fig. 29.

Fig. 32 is a further vertical section taken on line 32—32 of Fig. 29.

Fig. 33 is another vertical section taken on line 33—33 of Fig. 29 showing the cutting and forming mechanism for the stapler.

Fig. 34 is a similar section to Fig. 33 but showing the cutting and forming mechanism in a different position of operation.

Fig. 35 is a diagrammatic view of one of the swingable arms of the pick-up devices and the adjustable bearing in which it is pivoted; and Fig. 36 is a sectional aspect thereof.

The machine of the present invention comprises a suitable frame (Figure 3) for supporting the various operating parts, which frame is illustrated as including a base 1, vertical members 2, 3, and 4, fixed thereto and supporting a forwardly projecting top member 5. An electric motor 6 (Figure 4) supplies the power for driving the various operating parts, which motor is geared by speed reducing gearing to one of a pair of meshing spur gears 7 and 8. Said speed reducing gearing may be of any known kind but in the present instance is shown as a chain 9 connecting the sprocket 10 on the motor shaft to a comparatively large sprocket 11 which is mounted on said frame by a journalled shaft 12 and connected by a pinion 13 engaged with the spur gear 7.

Said spur gears 7 and 8 are fixed respectively on rear sections of shafts 14 and 15 (Figure 3). Said rear sections are indicated at 16 and each is horizontally journalled in the frame members 3 and 4 and connected as by a universal joint 17 to an intermediate shaft section 18 which in turn is connected by a universal joint 19 to a front shaft section 20. The front section 20 is journalled horizontally in a block 21 by means of spaced bearings 22, as best shown in Fig. 36. Said blocks are positionally adjustable for bands of different lengths as will be later dealt with more fully, and to this end the intermediate sections 18 of the



shafts 14 and 15 are of a telescopic structure, as indicated at 23, so as to cooperate with said universal joints in permitting the front sections 20 to be shifted laterally with said blocks 21.

A cam 24 is fixed on each of the front sections 20 of said shafts and is provided with a peripheral throw surface for actuating the pick-up devices which function to pick up the top band of a stack and to bend it into a ring-like shape around a ball of wool with its ends overlapped and disposed over an anvil for a stapling operation.

Said anvil is a stationary member 25 of a thin elongated shape which is supported on the top member 5 of said frame as at 26 to extend forwardly in a horizontal manner. It is tapered to more or less of a point at its forward end and has a flat upper face 27 provided with ordinary recesses (not shown) for bending over the ends of staples. A ball of wool, indicated at 28, is positioned immediately below the anvil so that in applying a band to the wool the ends of the band will be bent around the wool and over the anvil in an overlapped manner in order to be stapled together.

A stack of bands, indicated at 29, is supported transversely below the anvil and the bands are lifted one by one from the stack and fastened about a ball of wool. The stack of bands is supported on a table 30 which is automatically raised as bands are removed from it in order that the level of the stack will be substantially constant irrespective of the depth thereof. This level is essential because the pick-up devices swing between fixed points, as later explained, which requires that the top band be disposed at a given distance below the anvil.

The two pick-up devices are of identical construction and each comprises a head 31 (Figure 1) on the distal end of an arm 32. The arms are individually pivoted as at 33 to the blocks 21 to extend upwardly and inwardly therefrom and are crossed in side by side relation to swing in parallel planes at the rear of the anvil 25. The lower ends of the arms are provided with rollers 34 (Figure 12) engaged with the corresponding cams 24 whereby the arms are simultaneously swung upwardly in the rotation of shafts 14 and 15. Springs 35 (Figure 1) act to press the arms downwardly when permitted by the cams. The throw of the cams is such as to effect the required movement in sequences to other operations of the machine such as that of applying the staples. The heads 31 are each provided with fingers by which the top band of the stack is lifted and flexed around the ball of wool supported beneath the anvil 25. For this purpose the pick-up devices swing between fixed points.

It has been mentioned that upon removal of bands from the stack the table is elevated to substantially maintain the level of the stack. In other words the removal of several bands requires that the stack be raised a compensating distance, which necessitates elevating the table at frequent intervals so that the top band will always be at substantially the same distance from the anvil irrespective of the quantity of bands in the stack.

The means for elevating said table 30 (Figures 1 and 10) comprises a fixed vertical slide 36 on the front of said frame, to which is slidably attached a carriage 37 having a platform portion 38 on which said table is seated. Any suitable means, such as guide rods (not shown),

may be employed to retain the bands of the stack in proper alignment one with another so that they may not become inadvertently displaced in the running of the machine. A toothed rack 39 is vertically arranged at the front of said slide and secured at its upper end to said carriage. The lower end thereof is slidably guided in a bearing 40 rigid with the lower end of the slide 36.

A shaft 41 is journalled in the bearing 40 transversely of the rack 39 and extended to one side of said frame where it is provided with a hand wheel 42. The hand wheel is mounted to turn the shaft 41 and may be connected to the shaft in a direct manner or through the agency of a known type of clutch. A bearing 43 supports the shaft 41 adjacent to said hand wheel. This bearing is rigid with the base 1 of the frame.

On shaft 41 is fixed a gear 43 which is in constant mesh with the teeth of the rack 39. The rack is fed endwise on rotative movement of this shaft for raising and lowering the table 30. Also fixed on this shaft is a ratchet wheel 44 having one-way teeth engaged by a pawl 45 pivotally carried by an arm 46 loosely mounted on shaft 41 to turn independently thereof. Said ratchet wheel is held against endwise play along with the arm 46, which arm is oscillated to cause said pawl to turn said ratchet wheel in a direction for elevating the table 30. A single oscillation of said arm 46 advances the ratchet wheel a distance of one tooth and this movement elevates the table 30 merely a fraction of an inch which is sufficient to compensate for the removal of a comparatively few bands.

The arm 46 is motivated by a connecting rod 47 having a turn-buckle 47' for adjustment and forming a connection with a lever-like follower 48 which is pivoted at 49 and engaged with a wiper cam 50 having a throw element 51 by which a movement is imparted to said follower in each turn of a stub shaft 52. Cam 50 is a rotary member whose throw is sufficient to produce the required angular movement of the ratchet wheel 44. The follower 48 is held in engagement with the cam surface as by a spring—not shown.

The stub shaft 52 is journalled on the frame member 2 by a bracket indicated at 53 in Fig. 3, and on this shaft is keyed a ratchet wheel 54 having one-way teeth engaged by a pawl 55 pivotally carried by an arm portion 56 of a rocker bar 57. The rocker bar is pivoted on the stub shaft 52 and has a free arm 58 projecting into the path of a collar 59 rigid with a follower rod 60. The rod 60 is vertically guided for reciprocal movement as by a bearing 61 provided on a horizontal frame member 62, and a similar bearing provided on a lower cross member 63 of said frame—see Fig. 3.

Said arm 58 of the rocker bar is held in engagement with the collar 59 as by gravity means or spring pressure, and the upper end of rod 60 is engaged with a quick-drop cam 64 fastened on a countershaft 65 (Figure 3) which is journalled in bearings 66 on said frame member 62. The counter shaft 65 is horizontally arranged parallel to said shafts 14 and 15 and has a connection with the former by which it is driven. The driving connection (Figure 4) consists of the sprockets 67, 67' and the chain 68, which chain also extends to an overhead shaft 69 by means of a third sprocket 70. Shaft 69 serves to operate the stapling mechanism which is yet to be described. A fourth sprocket designated by 71 is engaged with a run of the chain to maintain the tension thereof, for which purpose it is journalled in an adjustable bearing 72 on the frame member 62—see Fig 4.

From the foregoing it will be understood that cam 64 is driven concurently with shafts 14 and 15 and during its rotation it acts to depress the rod 60. The depressional movement is translated into an angular movement of the rocker bar 57 by the collar 59. This movement is sufficient to advance the ratchet wheel 54 a distance of one tooth. Consequently the rod 60 must be reciprocated a number of times corresponding to the teeth on the ratchet wheel 54 before a complete turn is imparted to the cam 50. In this way the ratchet wheel 44 is only gradually advanced in the running of the machine and therefore the table 30 is raised with a step by step motion sufficient to restore the level of the stack of bands at such frequent intervals in the running of the machine as is required to maintain a stack of bands at a substantially uniform height while bands are being removed from the stack by the pick-up devices.

When a stack of bands is placed on the table the hand wheel is used to bring the stack to the required elevation so that the top band will be at the proper height with respect to the anvil. For this purpose the pawl 45 is temporarily disengaged until the adjustment is made.

Adverting to the pick-up devices it has been recounted that these comprise the heads 31 and the arms 32. In picking up a band from the stack 29 on the table 30 the crossed arms 32 swing in an upward direction inwardly on an arc of a circle under the influence of the cams 24. In the return movements the arms swing downwardly. Consequently the heads 31 are spread apart when lowered and travel towards each other in the upward swing of the arms 32. The pick-up devices are of identical construction, hence a description of one will suffice for both. The head 31 (Figure 18) of an arm comprises a bearing 73 integral with the arm or secured thereto and extended transversely thereof parallel to the axis of the pivot 33. The bearing 73 is bored through its length to provide an opening for a wrist pin 74 which is rotatably mounted therein and rigidly carries at its forward end a support 75 for a pair of gripping fingers 76 and 77. Said fingers are located laterally of the wrist pin 74 and project forwardly of the support 75 to extend over the stack of bands—see Fig. 11 in particular.

The finger 76 is rigid with the support 75 and has an inner face 78 provided with suction orifices 79 leading to an air duct 80 connected to a suction line, which in turn is connected to a source of suction. The suction line is made up of a length of flexible tubing 81 and a length of rigid tubing 82 (Figure 3). The flexible tubing extends from the finger 76 in order to accommodate the swing of the head 31. The source of suction is shown as a pump 83 to which the rigid tubing is connected. Said pump is of a standard reciprocating type having a piston rod 84 connected to a cam follower 85 engaged with a cam 86 on the section 16 of shaft 15. Said cam has a throw suitable for actuating said pump in timed relation to the operation of the pick-up devices.

When the head 31 is fully lowered the finger 76 assumes a position directly over an end of the top band of the stack with its face 78 in such close proximity thereto that suction produced at the

orifices 79 will lift the end of the band and hold it against this finger. Since this finger acts in conjunction with the like finger of the other pick-up device it will be understood that the band, is bodily raised from the stack when the pick-up devices begin to swing upwardly. In this way the band which is at the top of the stack is separated from the remaining bands.

The other finger 77 is a bent strip of spring metal which is of fairly stiff material and fixed to a rocker 87 to project forwardly alongside of the suction face 78 of the finger 76. The rocker 87 is pivoted on a slide 88 by means of a pivot 89. In this way the spring finger 77 is pivotally mounted with respect to the suction finger 76 for movement to and away therefrom and is also slidably mounted for endwise movement. The rocker 87 is biased about its pivot 89 by means of a torsional spring 90 to press the spring finger 77 away from the suction finger 76 for biasing the spring finger to an open position.

The slide 88 is dovetailed on the support 75 for reciprocal movement endwise of the wrist pin 74 and is forwardly biased by a compression spring 91 seated in a recess formed in said wrist pin axially thereof. On a side of the rocker 87 is a lug 92 carrying a set screw 93 disposed to abut a rear end face 94 on the suction finger 76. The compression spring 91 functions to urge the slide forwardly to project the spring finger 77 alongside of the suction finger 76 and in doing so the set screw 93 is caused to engage the face 94 of the relatively fixed finger 76 which overcomes the resistance of the spring 90 and turns the rocker 87 about its pivot 89 with the result that the spring finger is pressed toward the suction finger 76 in order to grip the end of a band which is held against the finger 76 by suction.

A latching device is provided to retain the slide 88 in retracted position while the pick-up device is being lowered and also while it is being partly raised. From this it will be gathered that the spring finger 77 is thus held retracted clear of the orifices 79 in the face 78 of the suction finger 76 so that the latter finger is free in its initial pick-up movement to pick up the end of a band.

In the retracted position of slide 88 the spring finger 77 is also held in an open position as shown in Fig. 16. This will be evident because in this position of the slide the set screw 93 is moved away from the contact face 94 and therefore the torsional spring 90 is able to act on the rocker 87 to retain the spring finger 77 in open position.

Said latching device (Figure 13) comprises a rod 95 slidable endwise through the wrist pin 74 and secured at its inner end to the slide 88. The outer end is provided with a roller 96. A latch 97 is pivoted at 98 on the bearing 73 and has a distal detent end 99 pressed toward said roller by a torsional spring 100. By this arrangement the latch automatically engages the roller when the slide 88 is retracted.

The slide 88 is held in a retracted position by the latch 97 while the pick-up device is being lowered, the withdrawal of the slide having been accomplished by a retracting mechanism which will be later described. The spring finger 77 is therefore in an open retracted position at the time the finger 76 picks up an end of the band by suction in the fully lowered position of the pick-up device. When the suctionally held end of the top band has been lifted well clear of the stack of bands then the latching device is automatically tripped so that the spring finger 77 will be projected and closed to positively grip the band end, whereupon the suction is cut off by movement of the cam 86 which acts on the pump 83. In this way the grip of the resilient finger replaces the suctional grip. The band end is carried upwardly in this manner toward the anvil 25 as it is being wrapped about the ball of wool.

While the end of the band is being lifted the support 75 is turned in the bearing 73 to impart a rotative movement to the fingers 76 and 77 in order to bend the band end around the adjacent side of the ball of wool and to bring the extremity of the band end over the anvil for stapling it to the opposite end of the band which is being similarly bent around the opposite side of the wool by the other pick-up device. In this manner the ends of the band are overlapped on the anvil below the bottom plate of the stapling device.

The means for automatically turning the fingers 76 and 77 of the pick-up device comprise a gear 101 and a rack 102 which act against a spring 103 arranged to yieldably retain the support 75 in set position in which the face 78 of the suction finger 76 is located parallel to the top band of the stack and in close proximity thereto when the pick-up device is fully lowered as in Fig. 1. The spring 103 is of the torsional type and is coiled about the bearing 73 with one end secured thereto and the other end secured to the support 75. The gear 101 (Figure 20) is keyed to the wrist pin 74 and engaged by the teeth of the rack 102, which rack is slidably mounted on the bearing 73 transversely of said wrist pin and provided with a roller 104 at one end.

Movement of the rack 102 is controlled by a fixed cam plate 105 (Figure 12) having a cam surface 106, formed by an edge face, with which the roller 102 is engaged. The cam plate 105 is secured to the block 21 at the opposite side of the frame to that on which the pick-up device is pivoted. According to this construction the roller end of the rack 102 rides on the cam surface 106 and follows the profile thereof, which cam surface is shaped to impart the required rotative movement to the fingers 76 and 77 in the upswing of the pick-up device.

The means for retracting the slide 88 (Figures 5 and 15) in order to open and withdraw the spring finger 77 when the ends of the band have been stapled comprises a lever 106' pivoted at 107 on the frame member 2 to extend upwardly at the rear of the pick-up devices. The upper end of the lever 106 is provided with a crossbar 108 which is normally disposed forwardly of the rollers 96 of the heads 31 and so located that its ends will be in front of the rollers when the pick-up devices are fully raised. The upper end of the lever 106' is retained in a forward position by a spring 109 attached to its lower end. This lower end is engageable by a push rod 110 adapted to be actuated by a cam 111 on the shaft 65. Accordingly when the ends of a band have been stapled the cam 111 comes into operation and thrusts the push rod 110 forwardly thus swinging the upper end of the lever 106 rearwardly so that the rollers 96 are withdrawn by the crossbar 108 and held in retracted position by the respective latches 97. As the pick-up devices swing downwardly the rollers 96 are carried away from the crossbar 108 and thus disengage themselves from it. The spring 109 restores the lever for a recurrent operation. The restored position of this lever is indicated in Fig. 15.

There is a tripping device (Figure 24) for the latch 97 of each pick-up device. The tripping device comprises a trip bar 112 projecting forwardly of the frame member 2 and supported thereon as by a block 113. The trip bar 112 is slidably mounted in the block 113 for a receding movement and is backed by a compression spring 114 which normally retains it in its forwardly projecting position. The forward end is shaped to provide a striker element 115 which is disposed in the path of travel of a pallet 116 (Figure 16) on the latch 97 of the respective pick-up device. At a predetermined point in the upward swing of the pick-up device the pallet 116 strikes the element 115 of the trip bar and swings it out of engagement with the engaged roller 96 thus permitting the spring 91 to press the slide 88 forwardly for projecting the spring finger 77 in a closing movement on the end of a band which is being held by the suction of the finger 76. The pallet 116 disengages itself from the trip bar 112 in the continued upswing of the pick-up device. In the down swing of the pick-up device the trip bar 112 recedes when it is contacted by the pallet 116 thus permitting the latch to pass without its being tripped.

When bands of a different length are to be applied to wool it is necessary to change the relative positions of the trip bars 112 to correspond to any adjustment made to the location of the pivots 33 of the pick-up arms 32. To effect the positional adjustment of the trip bars 112 the supporting block 113 (Figure 23) of each is mounted in ways 117 of a plate 118 attached to the frame member 2 and provided with a feed screw 119. This feed screw is journalled in the plate 118 and threadedly engaged with the block 113 and has an end 120 by which it may be turned by a wrench. Said feed screw is held against endwise movement in approved manner and one of the ways 117 may include a gib key 121 by which incidental play may be taken up. The tripping device above described is detailed in Figs. 23 to 27 inclusive.

To apply a band to a ball of wool it is necessary to place the ball, indicated at 28, immediately below the anvil 25 and to hold it in this position until the band ends have been stapled together, whereupon the banded ball is removed by pulling it away from the anvil endwise thereof. It has been mentioned earlier that a rotary conveyor is employed for this purpose. The rotary conveyor is illustrated in Figs. 6 to 9 inclusive, and comprises a spider generally indicated by the numeral 123 and horizontally arranged at the front of the machine by means of a hub element 124 secured on a vertical post 125. A standard 126 supports the post for rotary movement for which purpose it is supplied with bearings indicated at 126'.

The hub 124 carries a circular series of radial holders 127, only a few of which are shown in Fig. 7, which holders are mounted on said hub as by bearings 128 to slide outwardly and are retracted by tension springs 129. Said holders have outer ends forming heads 130 each receptive to a ball of wool. Said heads have rounded ends 131 with reduced neck portions 132 and inner collars 133. A ball of wool is placed on each head to abut the collar 133 thereof. The spider is disposed with one of said holders extending toward said anvil in the same vertical plane but terminating short thereof at a somewhat lower level so that when radially projected the holder will thrust the ball of wool immediately below the anvil and support it in this position until a band has been applied, whereupon the holder is retracted and the spider is turned to substitute the next holder on which a ball of the wool has previously been placed. Said spider is actuated to have a step by step motion in timed relation to the stapling operation and an actuating mechanism is provided for the holders to severally project them at proper intervals with respect to the intermittent movement of the spider. Balls of wool are placed on said holders by an attendant as they turn toward the anvil and when banded the balls are removed by hand as the holders are carried away from the anvil.

The actuating mechanism for intermittently rotating said spider comprises a ratchet wheel 134 fixed on the post 125 and engaged by a pawl 135 pivoted on an arm 136 which is loosely mounted on said post to oscillate freely. A connecting rod 137 attaches the arm 136 to a bellcrank 138 vertically arranged and fulcrumed at 139 on the frame element 63 by a bracket 140. A vertically arranged follower rod 141 is guidably supported for vertical movement as by a swivelled bearing 142 on the lower frame element 63 and has its lower end engaged with arm 143 of the bellcrank 138. The upper end of rod 141 is pivotally connected to a rocker 144, which rocker is pivoted at 145 on the top frame member 5 and provided with a roller 146 engaged with a cam 147 secured on the shaft 65. The cam 147 has a throw for actuating the rocker in timed relation to the stapling unit. Operation of this rocker depresses the rod 141 and thus swings the bellcrank 138 to cause the connecting rod 137 to actuate the ratchet mechanism on the post 125. Accordingly the spider is given a partial turning movement in a complete operation of the machine in which a band is stapled. Spring means (not shown) is used to return this ratchet mechanism for a subsequent operation.

The mechanism for projecting the holders 127 of the rotary conveyor comprises a vertically arranged projector bar 148 pivoted at 149 on the standard 126 intermediate of its length and having an upper end disposed to engage a lug 150 on a holder when the holder is positioned for thrusting a ball of wool beneath the anvil. A connecting rod 151 is attached to the lower end of said projector bar 148 and also connected to an arm of a bellcrank 152. This bellcrank is pivoted at 153 on the frame member 63 and has its other arm 154 engaged by the lower end of the follower rod 60. It will be manifest that by this construction an actuating movement is imparted to the bellcrank 152 when the follower rod is depressed by the cam 64 as previously recounted. This movement causes the connecting rod 151 to throw the upper end of the projector bar 148 forwardly so that it acts on the lug 150 of the aligned holder 127. Return movement of the projector bar is timed to take place when a band has been placed about the ball of wool on the projected holder and stapled.

When a band has been applied to a ball of wool with its ends brought together in overlapping formation over the anvil 25 the ends are secured together by two parallel staples, designated by the reference character S in Fig. 7, which are set at right angles to the longitudinal axis of the band. The staples are formed and applied by the stapler which is located above the anvil.

The stapler illustrated in Figures 5 and 28–34 inclusive comprises vertical guide tubes 155 through which wire 156 is drawn from a source of supply. Said guide tubes are fixed in a bear-

ing plate 157 which is attached to the top frame member 5. The wire is fed through tubular elbows 158 which guide it through loose tubes 159. Said loose tubes deliver the wire to the cutting and forming unit.

The elbows 158 are movable with a feeding device and are spaced below the guide tubes 155 to form a vertical gap which exposes runs of the wires. The feeder device comprises a loop-shaped jaw 160 which passes around the outer side of the wires in contact therewith and is carried by a collar 161 on a sleeve 162. The sleeve 162 is vertically slidable in the bearing plate 157 and has a follower 163 slidably contained in it. The follower 163 is provided with a roller 164 at its upper end which is engaged with a cam 165 on the cam shaft 69. The sleeve 162 is held in a raised position with the collar abutting the bearing plate 157 by means of springs 166 and on the collar is pivoted at 167 a jaw 168 which extends below the follower 163 and is upturned at its free end to engage the sections of the wires with which the jaw 160 is in contact.

In a wire feeding operation the follower 163 is initially depressed by the cam 165 with the result that the pivoted jaw 168 is swung into gripping engagement with the wires in order to clamp them against the jaw 160. In the continued throw of the cam 165 the follower abuts the sleeve 162 and lowers both jaws, which feeds a sufficient amount of wire into the cutting and forming unit to make the two staples. The mechanism of the feeding device then returns under the influence of springs 166 for a recurrent operation. The tube 159 is loosely connected to the elbow 158 and the cutting and forming unit so that it can accommodate relative movement thereof.

The cutting and forming unit is indicated as a whole by the numeral 169 and is vertically guided for a lowering movement by means of members 170 slidable on the top member 5 of the frame and held in raised position by compression springs 171.

The members 170 are oppositely arranged and have lower parts which extend inwardly and terminate short of each other to provide an intervening gap. At the top of said lower parts is a plate 170' by which the members are rigidly connected together, and in the gap is a bearing member 170'' in block form which rigidly depends from the plate 170'. Fixed on the bearing plate 170' is a bottom plate 172 which, when the cutting and forming unit is lowered, lightly contacts the ends of the band over the anvil while the staples are being applied. The wire material 156 is fed over the top of the bottom plate 172 through suitable guide passages, and the rear top edge of the bottom plate is a cutting or shearing edge which co-acts with a movable die 173 for shearing the wires so that severed ends can be formed into staples.

The movable die 173 is vertically slidable on the bearing member 170'' and is provided with a transverse slot which is open to the bottom face of the movable die. This slot forms a pair of spaced elements 174 for bending the cut-off lengths of material over movable blocks 175 to fashion the material into staples. The inner of the two elements 174 is the part of the die which co-acts with the bottom plate 172 to shear the material.

A depressional movement is imparted to the die 173 by a follower 176 vertically slidable in the bearing plate 157 and actuated by a cam 177 on the cam shaft 69. In the depressional movement the material is first cut and then bent by the elements 174 over the movable blocks 175 into U-shaped staples. Said movable blocks are horizontally mounted in guideways in the members 170 for movement transversely of the machine. The inner end of each block is disposed beneath a cut length of the wire while the die is descending to bend the wire. When the wire is bent the movable blocks are withdrawn by fingers 178—see Fig. 34—to permit a plunger to drive the staples through the band. The fingers are pivoted at 179 on the members 170 and are operably contacted by said plunger, indicated at 174', mounted in the said slot of the die 173 between the elements 174.

The plunger 174' is depressed by a bar 180 pivoted at 181 and engaged by a follower 182 actuated by a cam 183 on the cam shaft 69. A separate cam 184 on the cam shaft 69 acts on a follower 185 to lower the members 170 along with the members 170' and 170'' of the unit.

While this staple forming unit has been found to be satisfactory, it is not intended that the invention shall be limited to the specific construction thereof because it is apparent that a conventional structure might be substituted, or on the other hand preformed staples could be used without departing from the scope of the invention.

From the foregoing it will be manifest that the invention provides an automatic machine in which balls of wool are successively fed directly beneath the anvil by the rotary conveyor and in which a stack of bands is supported on the table with the top band thereof spaced a set distance below the anvil so that it can be picked up by the pick-up devices, the arms of which have a determined swing between the bands and the anvil. In the upward swing of the arms the heads thereon closely approach the sides of the anvil so that the ends of a band will be held in an overlapping manner overlying the anvil for the stapling operation. When the pickup devices are swung to fully lowered position the pneumatic fingers 76 grip the ends of the top band by suction in order to initially raise the band clear of the remaining bands as the travel of the pick-up devices is reversed in swinging upwardly. In the upward sweep the fingers 77 are projected into clamping engagement with the ends of the band to securely grip them, at which time the suctional hold is released. The fingers 76 and 77 are turned inwardly in the upsweep of the pick-up devices to bend the band around the positioned ball of wool and to overlap the ends of the band on the anvil. The stapler forms the staples and the forming unit thereof is lowered toward the anvil for applying the formed staples while the band is held by the pick-up arms. The pick-up devices release the band when it has been stapled and the banded wool is replaced. In the down swing of the pick-up devices the fingers 76 and 77 are reversely rotated and the resilient fingers are retracted to open position so that the suction fingers may pick up another band in a recurrent operation. The mechanism of the machine is so co-ordinated that a band is applied to a ball of wool in each complete revolution of the shafts 14, 15, 65 and 69.

A feature of the machine is that the pick-up devices may be adjusted to suit a given length of

band. For this purpose the sections 20 of the shafts 14 and 15 are mounted in the blocks 21 on which the pick-up arms 32 are pivoted and to which the stationary cams 105 are attached, as has been previously described. The blocks 21 have curved bottom faces 187 by which they are seated on arcuate faces 188 of a bed plate 189 rigid with the base 3 of the frame. The arcuate faces 188 are made up of two curvatures, one at each side of the anvil and each curved on a radius R, Fig. 35, taken at a point coincident with the face 78 of the finger 76 of the respective pick-up arm when this finger assumes a position adjacent to the anvil in the stapling operation. Accordingly when the relative positions of the blocks 21 are changed to suit a band of a different length the position of the finger 76 is not changed relative to the anvil in the fully raised position of the respective pick-up arm. The blocks 21 are adjustably secured to the bed 189 by means of flanges 190 and bolts 191, which bolts are lodged in curved, elongated slots 192.

It is thought that the construction and operation will be clearly understood from the foregoing description and it will be manifest that such changes and modifications of the invention may be resorted to as clearly come within the scope of the ensuing claims.

What I claim is:

1. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices supported on said frame to swing between the top of said table and the sides of said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around the ball of wool with its ends overlapped and overlying said anvil, and means for fastening together said overlapped ends of the band while said ends are supported by said anvil.

2. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, means for adjustably supporting said table on said frame and for elevating it automatically at timed intervals to maintain a stack of bands thereon at substantially a constant level as the depth of the stack is reduced by removal of bands therefrom, an anvil mounted on said frame above said table and spaced therefrom, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices supported on said frame to swing between the top of said table and the sides of said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around the ball of wool with its ends overlapped and overlying said anvil, and means for fastening together said overlapped ends of the band while said ends are supported by said anvil.

3. A machine as defined in claim 2, in which the means for adjustably supporting and elevating the table comprises a carriage vertically slidable on the frame, a toothed rack connected to said carriage for movement therewith, a gear journalled in the frame and meshed with said rack, and means for actuating said gear including a ratchet mechanism and a cam mechanism.



4. In a machine for attaching paper bands to balls of wool, pick-up devices supported to swing downwardly to lowered positions, a table disposed below said pick-up devices for supporting a stack of bands, and means for adjustably supporting said table and for elevating it automatically at timed intervals to maintain a stack of bands thereon at substantially a constant level with respect to the lowered positions of said pick-up devices as the depth of the stack is reduced by repeat operations of said pick-up devices.

5. A structure as defined in claim 4, in which the means for adjustably supporting and elevating the table comprises a carriage vertically slidable on the frame, a toothed rack connected to said carriage for movement therewith, a gear journalled in the frame and meshed with said rack, and means for actuating said gear including a ratchet mechanism and a cam mechanism.

6. A structure as defined in claim 4, in which the pick-up devices are actuated by means including a driven shaft, and in which the means for supporting and elevating the table comprise a ratchet and cam mechanism including a rack gear, a first ratchet wheel rigid with said gear, an arm pivoted alongside said ratchet wheel, a pawl thereon engaged with said ratchet wheel, a pivoted cam follower, a connecting rod attaching said arm to said cam follower, a first cam supported for rotary movement and engaged with said cam follower, a second ratchet wheel, said second ratchet wheel being mounted to turn with said cam, a rocker bar pivotally supported alongside of said second ratchet wheel, a pawl thereon engaged with said second ratchet wheel, a follower rod supported for endwise movement and having a collar for imparting a turning movement to said rocker bar when said follower rod is moved endwise, a second cam journalled to rotate for actuating said follower rod, and means for driving said second cam from the said driven shaft of the actuating means for said pick-up devices.

7. A machine as defined in claim 2, in which the means for adjustably supporting and elevating the table comprises a carriage vertically slidable on the frame, a toothed rack connected to said carriage for movement therewith, a gear journalled in the frame and meshed with said rack, and ratchet and cam means for actuating said gear, said ratchet and cam means including a compound ratchet mechanism with an interposed cam mechanism, said compound ratchet mechanism being characterized by a first ratchet wheel, a second ratchet wheel, and a pawl connected to the second ratchet wheel and actuated by said interposed cam mechanism periodically to impart a fractional turning movement to the second ratchet wheel in each complete revolution of the first ratchet wheel.

8. A machine as defined in claim 1, in which the means for attaching the band ends includes a stapling device.

9. A machine as defined in claim 1, in which a stapler is mounted on the frame directly above the anvil and provided with an element for driving a staple through the overlapped band-ends and clinching it on the anvil to fasten the ends of the band together, and means for operating said element in timed relation to the pick-up devices.

10. A machine as defined in claim 1, in which a stapling mechanism is mounted on the frame

above the anvil and provided with a staple-forming and driving unit, and in which means are provided to operate said unit in timed relation to the pick-up devices and to lower said unit for driving a staple through the band-ends and clinching it on the anvil.

11. A machine as defined in claim 1, in which a stapling mechanism is mounted on the frame above the anvil and provided with a staple-forming and driving unit, and in which cam means are provided to operate said unit in timed relation to the pick-up devices and to lower said unit for driving a staple through the band-ends and clinching it on the anvil.

12. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, said anvil being horizontally arranged and projected forwardly from a supported end and tapered to a substantially pointed free end, said anvil having a flat top surface, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices supported on said frame to swing between the top of said table and the sides of said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around the ball of wool with its ends overlapped and overlying said anvil, and means for fastening together said overlapped ends of said band while the ends are supported by said anvil.

13. A structure as defined in claim 12, in which the means that uses the anvil as a support in attaching together the overlapped ends of the band is a stapler mounted over said anvil, and in which the top surface of said anvil is recessed to clinch a staple when it has been driven through the ends of the band.

14. A machine as defined in claim 1, in which the means for centrally supporting a ball of wool immediately beneath the anvil comprises a holder on which the wool is placed, said holder being movable to and away from said anvil.

15. A machine as defined in claim 1, in which the means for centrally supporting a ball of wool immediately beneath the anvil comprises an automatic feeding device having a holder on which a ball of wool is placed and then thrust beneath the anvil.

16. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, means for successively stationing balls of wool immediately beneath said anvil, a pair of pick-up devices supported on said frame to swing between said table and said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around a ball of wool stationed beneath said anvil with the ends of the band overlapped and overlying said anvil, and means for fastening together said overlapped ends of said band while the ends are supported by said anvil.

17. A machine as defined in claim 16, in which the means for successively stationing balls of wool immediately beneath the anvil comprises an automatic feeding mechanism having a plurality of holders on which balls are placed and individually supported, and in which said automatic feeding mechanism is operated in timed relation to the pick-up devices.

18. A machine as defined in claim 16, in which the means for successively stationing balls of wool immediately beneath the anvil comprises a rotary spider having a plurality of radial holders on which the balls are placed and fed by a step by step movement of said rotary spider so as to successively bring said holders into alignment with said anvil.

19. A machine as defined in claim 16, in which the means for successively stationing balls of wool immediately beneath the anvil comprises a rotary spider having a plurality of radial holders on which the balls are placed and fed by a step by step movement of said rotary spider so as to successively bring said holders into alignment with said anvil, and in which said holders are projected beneath said anvil when they come into alignment therewith.

20. In a machine for attaching paper bands to balls of wool the combination with an anvil and pick-up devices for wrapping a band around a ball of wool placed beneath the anvil for a stapling operation, of means for feeding balls of wool to said anvil and individually supporting them beneath the same in timed relation to said pick-up devices, said means comprising a rotary spider, radial arms carried thereby for outward movement beneath said anvil, resilient means retaining said holders in retracted positions, a ratchet mechanism for rotating said spider, a cam mechanism for motivating said ratchet mechanism, a thrust bar for projecting said holders, and cam means for actuating said thrust bar.

21. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices having pivotally supported arms by which they are arranged to swing between the top of said table and the sides of said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around the ball of wool with its ends overlapped and overlying said anvil, means for actuating said pick-up devices, and means for fastening together said overlapped ends of said band while the ends are supported by said anvil.

22. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices having crossed arms which are pivotally supported and arranged to swing between the top of said table and the sides of said anvil, said pick-up devices including gripping fingers provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said fingers to grasp the lifted band by its ends for wrapping it around the ball of wool with its ends overlapped and overlying said anvil, means for swinging said arms, and means for fastening together said overlapped ends of said band while the ends are supported by said anvil.

23. A machine as defined in claim 22, in which the means for swinging the arms comprises rotary cams engaged with said arms and connected to a drive mechanism whereby said arms are operated in unison with a relative to and away motion.

24. A machine for attaching paper bands to balls of wool comprising a frame, a table for supporting a stack of bands, an anvil mounted on said frame above said table and spaced therefrom, means for centrally supporting a ball of wool immediately beneath said anvil, a pair of pick-up devices having crossed arms pivotally supported to swing between lowered and raised positions, said pick-up devices including gripping fingers mounted on said arms in pairs and provided with suction means for lifting a band clear of said stack, said pick-up devices also including means for causing said gripping fingers to grasp said band by its ends when lifted, each pair of gripping fingers being rotatably arranged to bend the band around the ball of wool in the upswing of said arms so that the band will be wrapped around the wool with its ends overlapped and overlying said anvil, means for producing such rotary movement of said pairs of gripping fingers, means for swinging said arms, and means for fastening together said overlapped ends of said band while the ends are supported by said anvil.

25. A machine as defined in claim 24, in which the means for rotating each pair of gripping fingers comprises a member journalled in the corresponding arm and provided with a gear, a toothed rack slidably mounted on said arm and meshed with said gear, and a relatively fixed cam plate having a cam face engaged with said rack.

26. A machine as defined in claim 21, in which the gripping fingers are arranged in pairs on each of the arms, and in which one finger of each pair is provided with pneumatic means for initially lifting a band end by suction, and the other finger thereof is movably mounted to close against said band end when the band has been lifted clear of the stack.

27. A machine as defined in claim 21, in which the gripping fingers are arranged in pairs on each of the arms, and in which a pair comprises a movable finger and a relatively fixed finger, said movable finger being mounted to slide forwardly into a projected position opposite the relatively fixed finger and to close thereagainst when projected, and means for actuating said movable finger.

28. A machine as defined in claim 21, in which the gripping fingers are arranged in pairs on each arm, and in which a pair comprises a movable finger and a relatively fixed pneumatic finger for producing a suctional grip on the end of a band, said movable finger being pivotally carried by a retractile slide and resiliently projected in a closing movement for clamping said band end against said relatively fixed finger.

29. In a machine for attaching paper bands to balls of wool, a pair of pick-up devices for picking up the top band from a stack of bands and wrapping it around a ball of wool supported above the stack, said pick-up devices comprising oppositely arranged arms pivoted to swing between said stack and said wool, and heads carried by said arms and having gripping fingers for grasping the ends of the top band of the stack, said fingers being rotatably mounted to turn for flexing said top band around the wool when said heads are swung upwardly.



30. In a machine for attaching paper bands to balls of wool, a pair of pick-up devices for picking up the top band from a stack of bands and wrapping it around a ball of wool supported above the stack, said pick-up devices comprising oppositely arranged arms pivoted to swing between said stack and said wool, and gripping fingers rotatably mounted on said arms, said gripping fingers including pneumatic fingers for suctionally lifting the top band from said stack when said arms are swung upwardly.

31. A structure as defined in claim 30, in which the pneumatic fingers have a perforated face of which the perforations communicate with a duct, and in which said duct is connected to a tube extending to a source of air suction.

32. In a machine for attaching paper bands to balls of wool, a pair of pick-up devices for picking up the top band from a stack of bands and wrapping it around a ball of wool supported above the stack, said pick-up devices comprising oppositely arranged arms pivoted to swing between said stack and said wool, and gripping fingers rotatably mounted on said arms, there being a pair of gripping fingers on each arm, each pair of gripping fingers being mounted to turn, one of each pair being movable relative to the other for opening and closing movements and also being retractile, means for opening and closing said movable finger, and means for retracting it.

33. In a machine for attaching paper bands to balls of wool, a pair of pick-up devices for picking up the top band from a stack of bands and wrapping it around a ball of wool supported above the stack, said pick-up devices comprising oppositely arranged arms pivoted to swing between said stack and said wool, and heads carried by said arms, each head comprising a wrist pin journalled therein, a support rigid with an end thereof, a pneumatic finger fixed on said support, a slide on said support, a movable finger pivoted on said slide to close and open relative to the pneumatic finger, a rod slidably extending through said wrist pin and connected to said slide, a spring biasing said slide to project said movable finger into a position for closing against the pneumatic finger, means for causing the movable finger to close as it is projected, and latching means for said slide whereby the movable finger is held in an open retracted position.

34. In a machine for attaching paper bands to balls of wool, a pair of co-acting pick-up devices for jointly picking up the top band of a stack of bands and wrapping it around a ball of wool supported above the stack for attachment of the band, each pick-up device comprising a pivotally supported arm, means for swinging said arm upwardly and returning it, a support journalled on said arm, a finger rigid with said support, a projectible slide on said support, a block pivoted on said slide, a resilient finger carried by said block, a spring acting on said slide to project it for moving said resilient finger endwise to position it opposite said rigid finger, means for turning said block to close said resilient finger against said rigid finger in the projection of said slide, a latching device on said arm for holding said slide in a non-projected position, and a trip device supported independently of said arm and operable in the upswing thereof to release said latching device.

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No references cited.