Jan. 7, 1964 H. M. FISHER 3,116,544

SLIDER APPLICATOR

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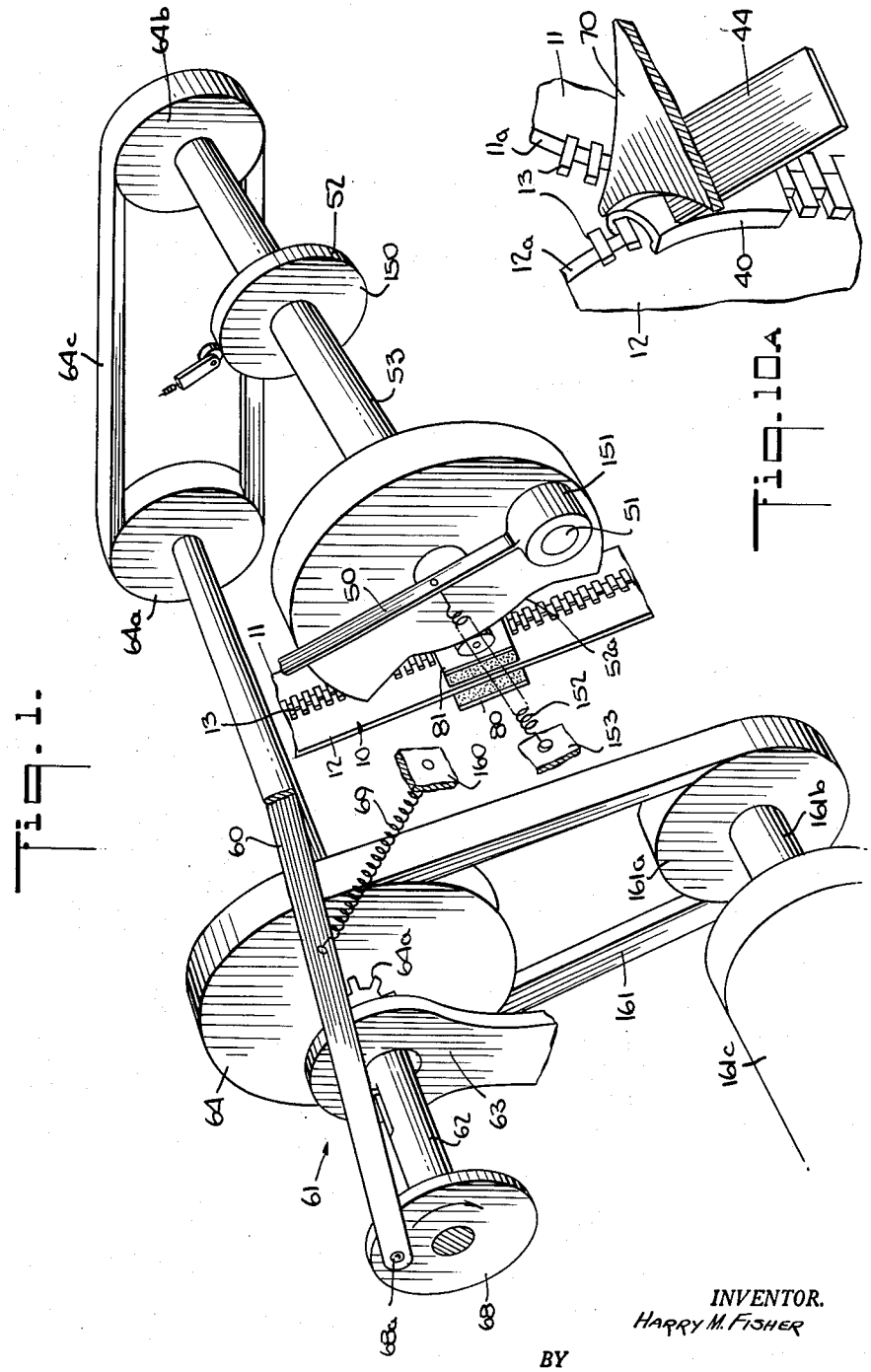


Fig. 1.

Fig. 10A

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Fig. 1A.

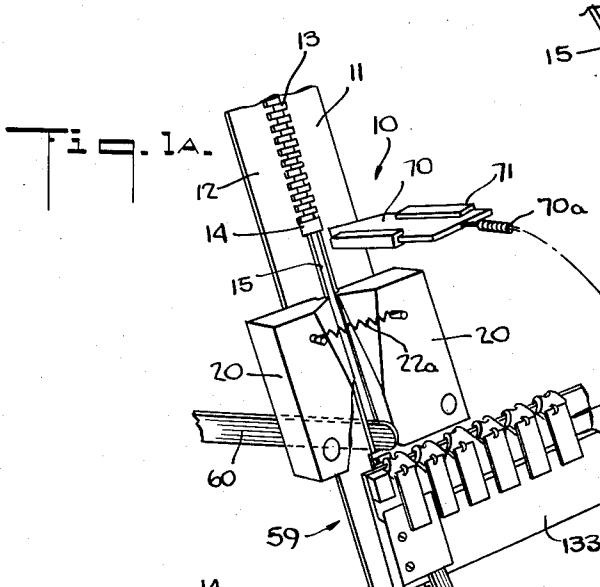
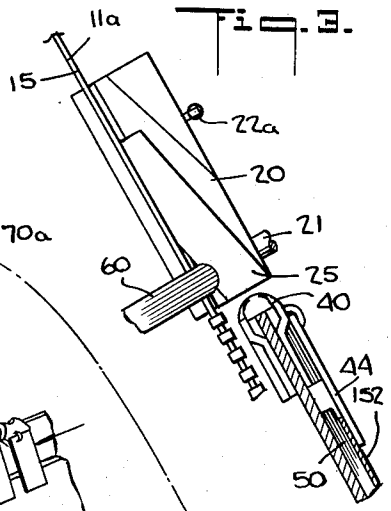


Fig. 3.



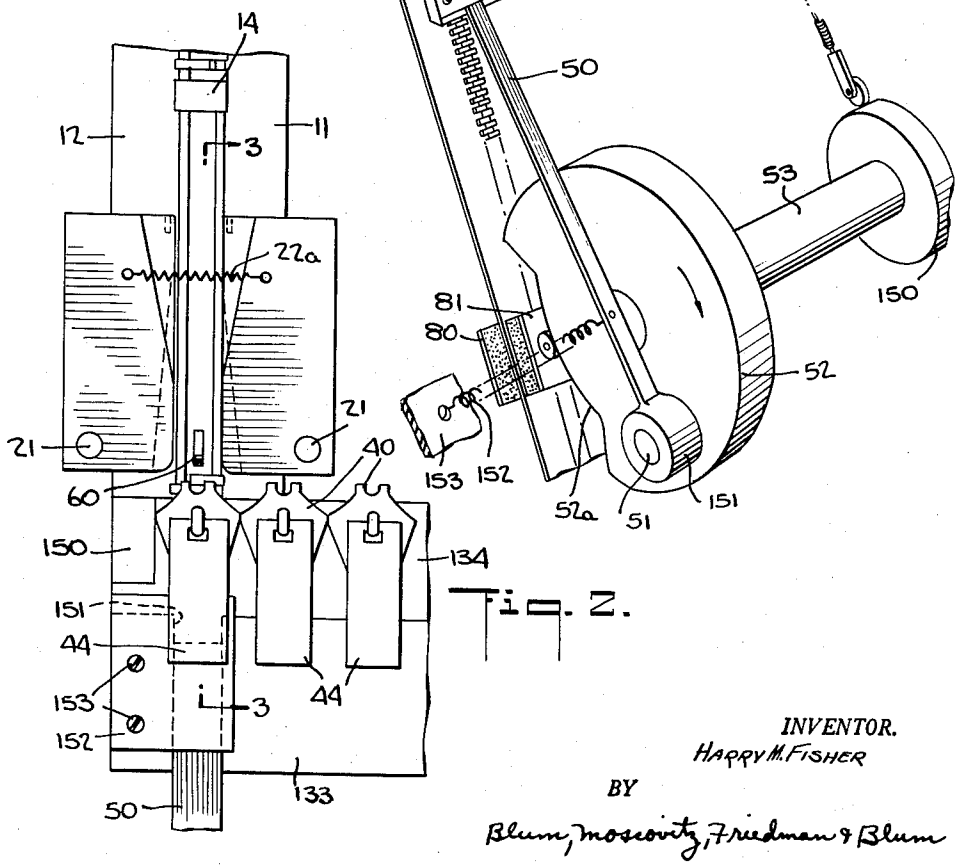


Fig. 2.

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Fig. 4.

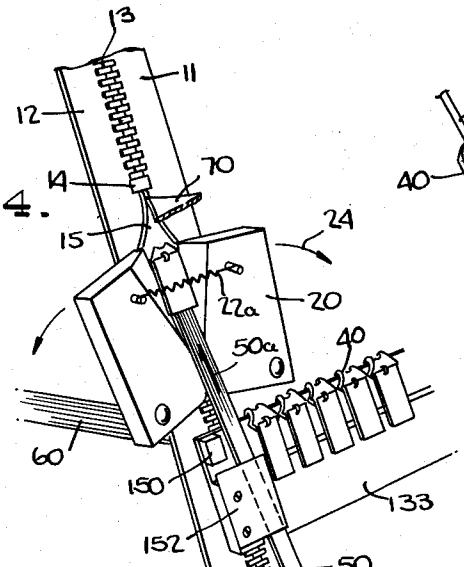


Fig. 6.

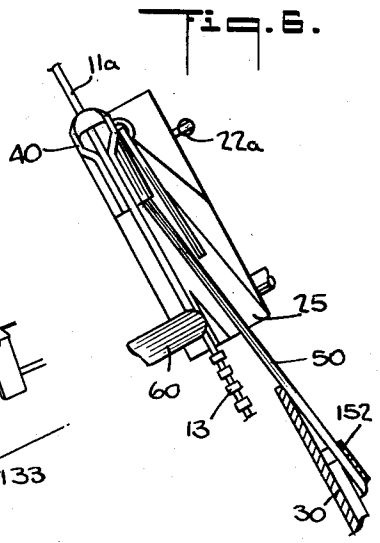


Fig. 5.

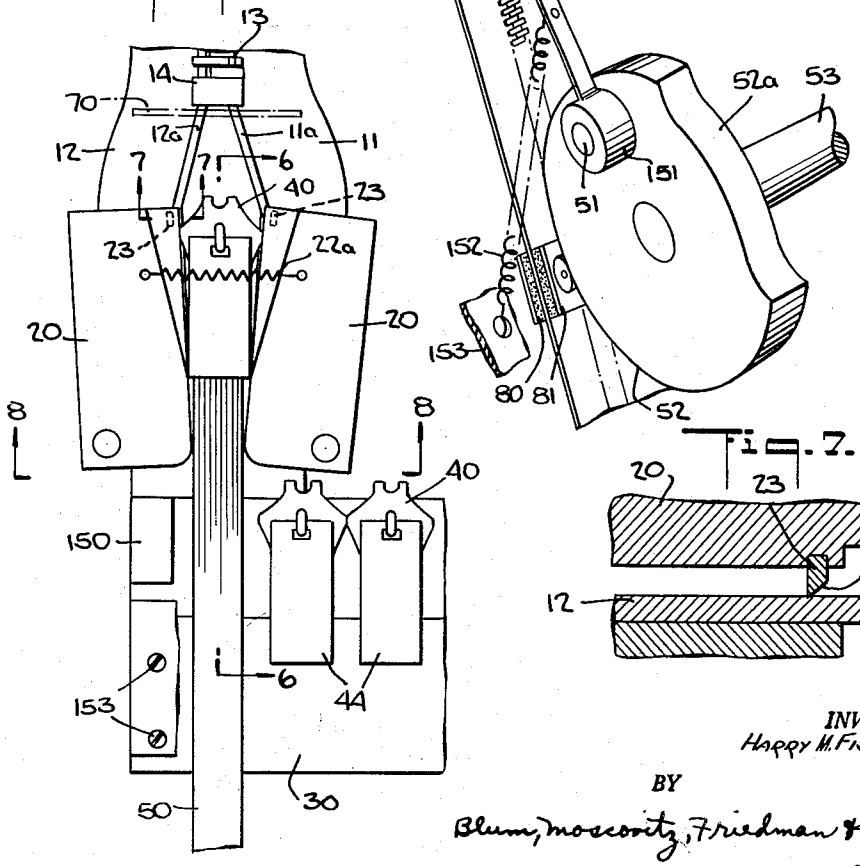


Fig. 7.

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Fig. 10.

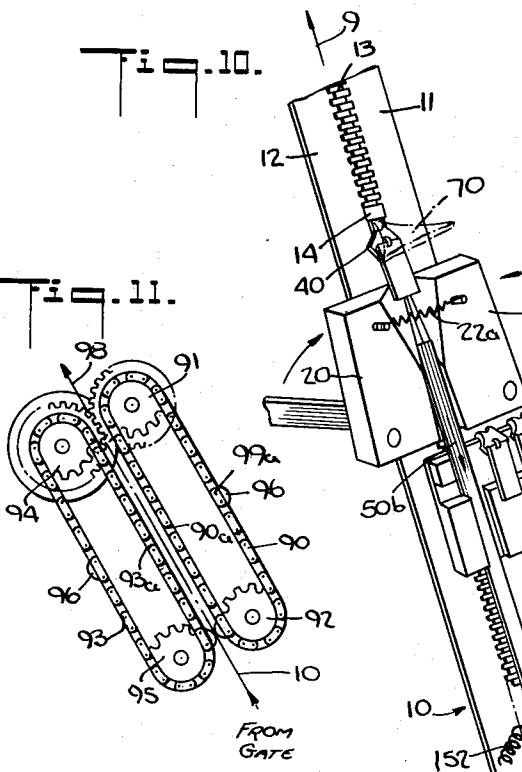


Fig. 8.

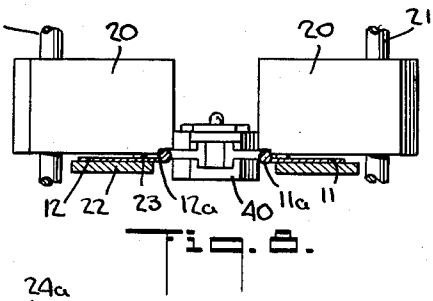


Fig. 11.

Fig. 12.

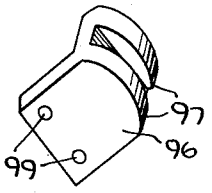
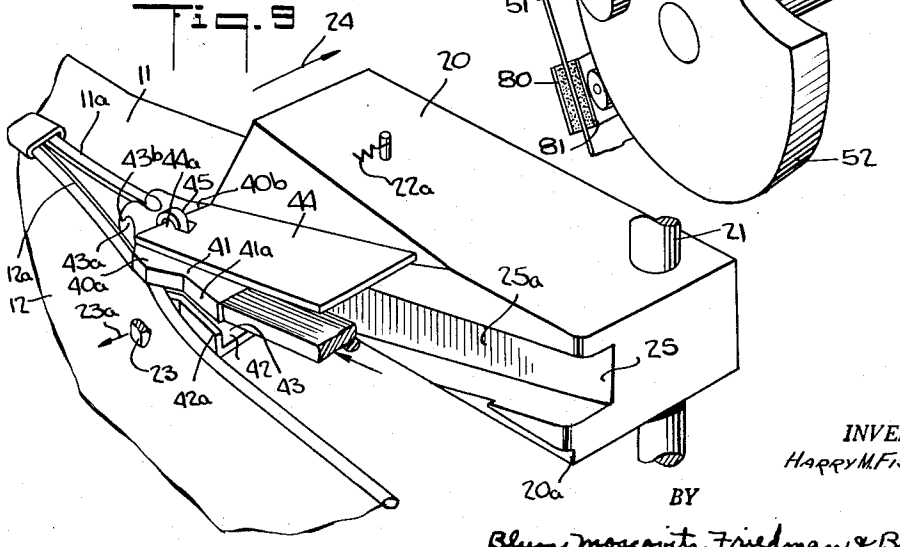


Fig. 9



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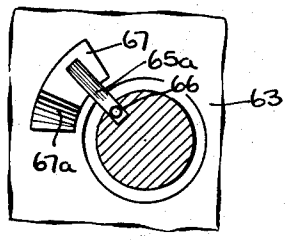


Fig. 16.

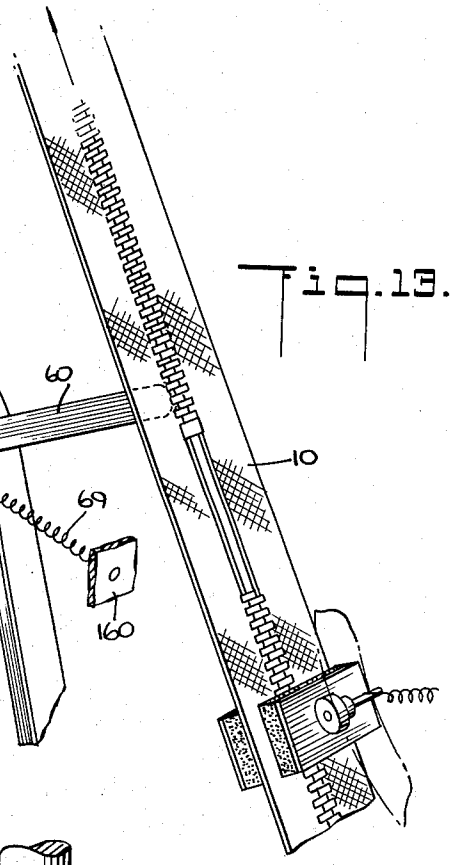
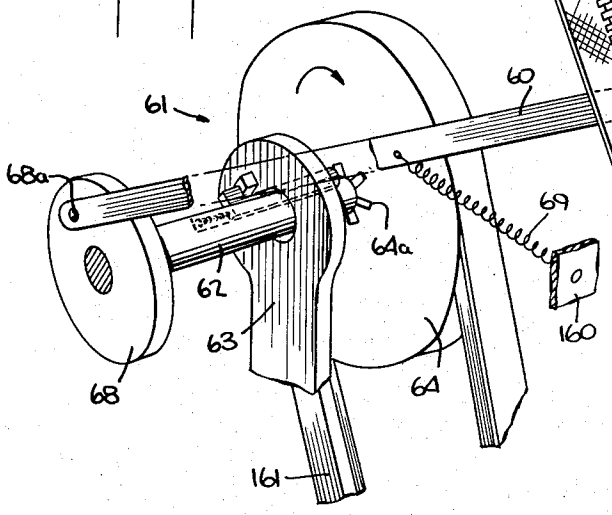


Fig. 13.



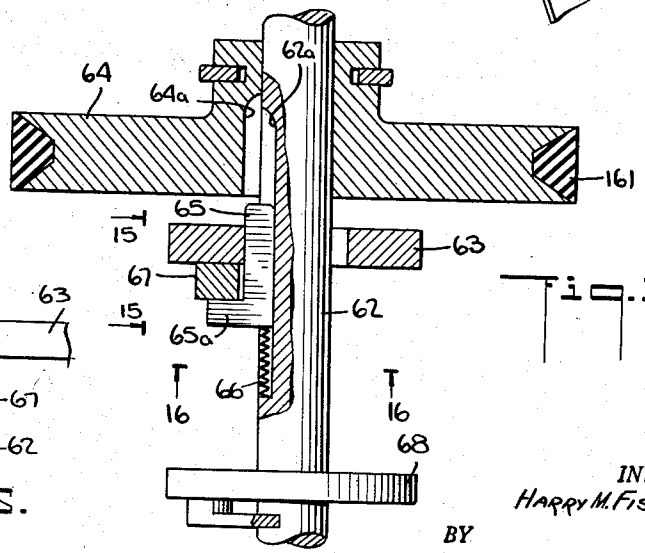


Fig. 14.

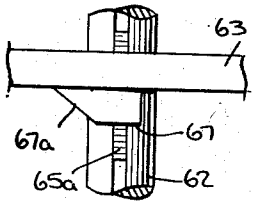


Fig. 15.

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SLIDER APPLICATOR

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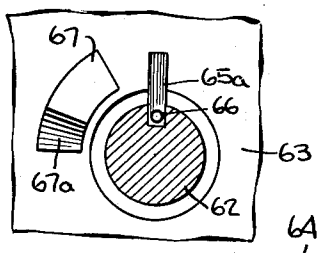


Fig. 19.

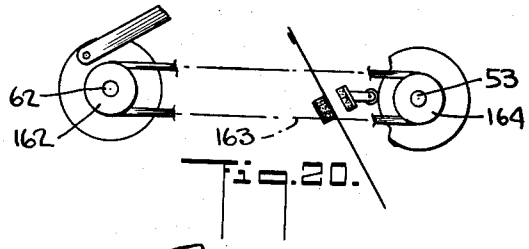


Fig. 20.

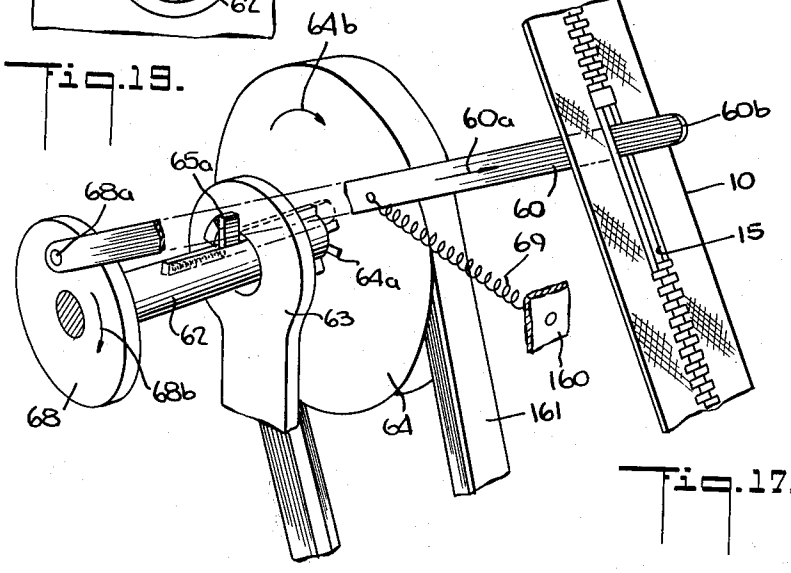


Fig. 17.

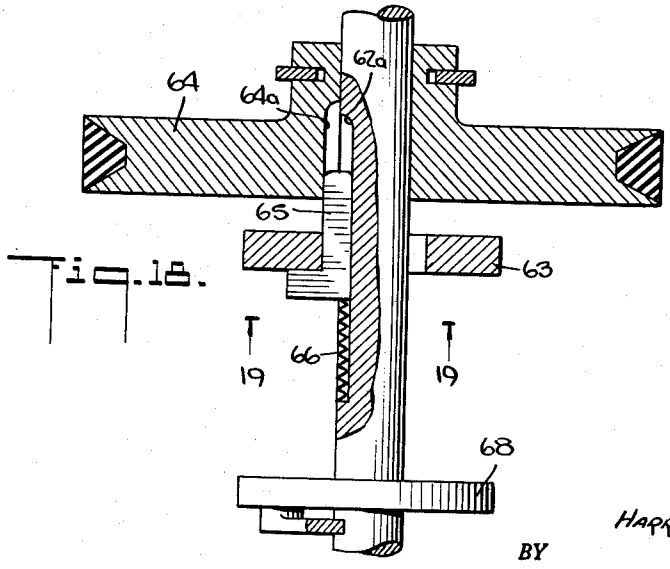


Fig. 18.

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SLIDER APPLICATOR

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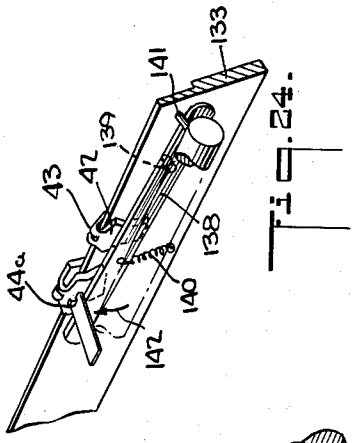


Fig. 24.

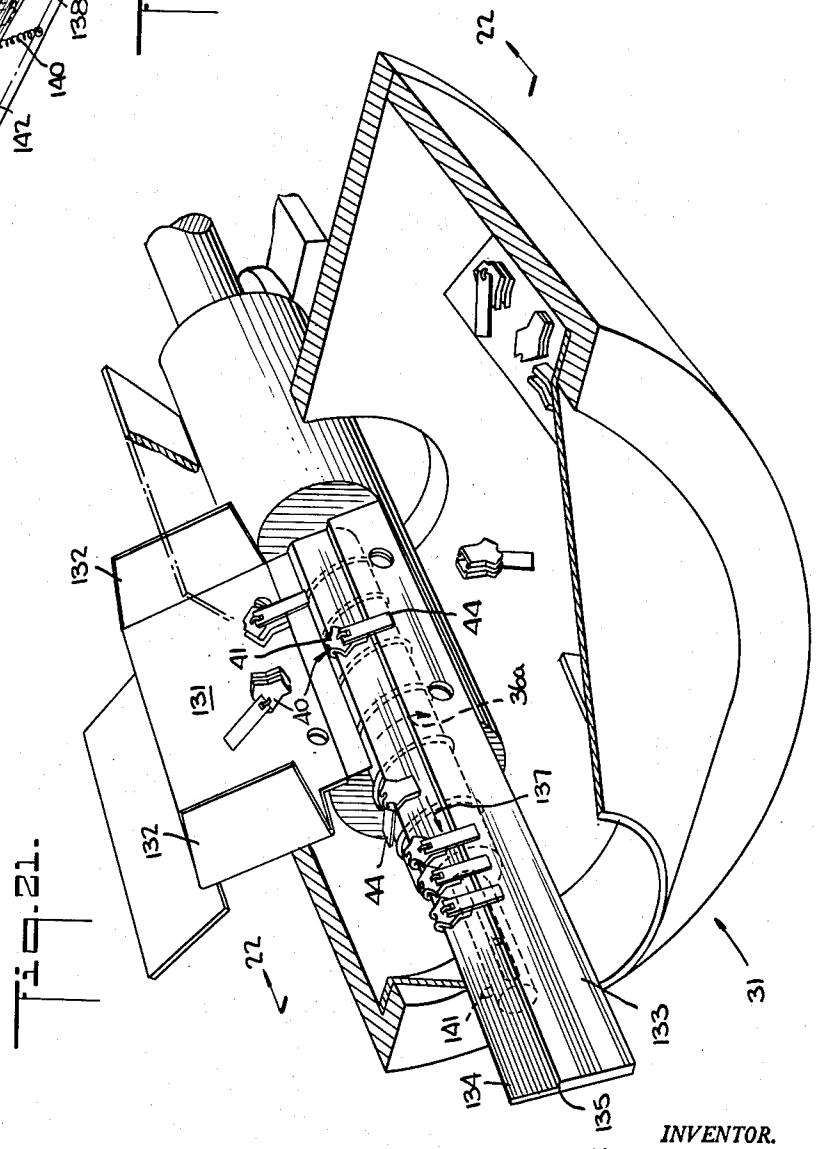


Fig. 21.

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SLIDER APPLICATOR

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Fig. 22.

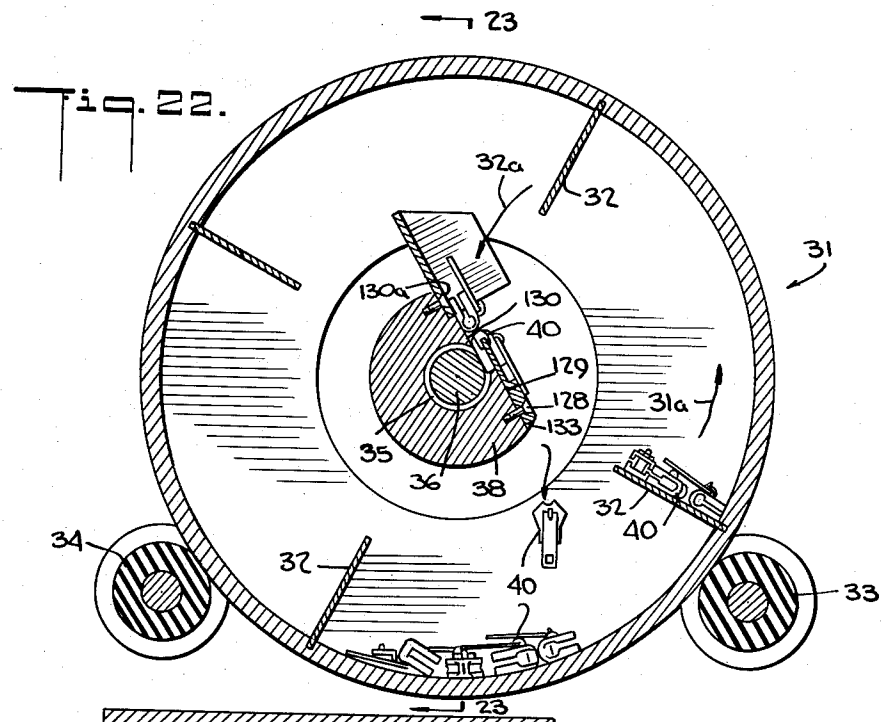
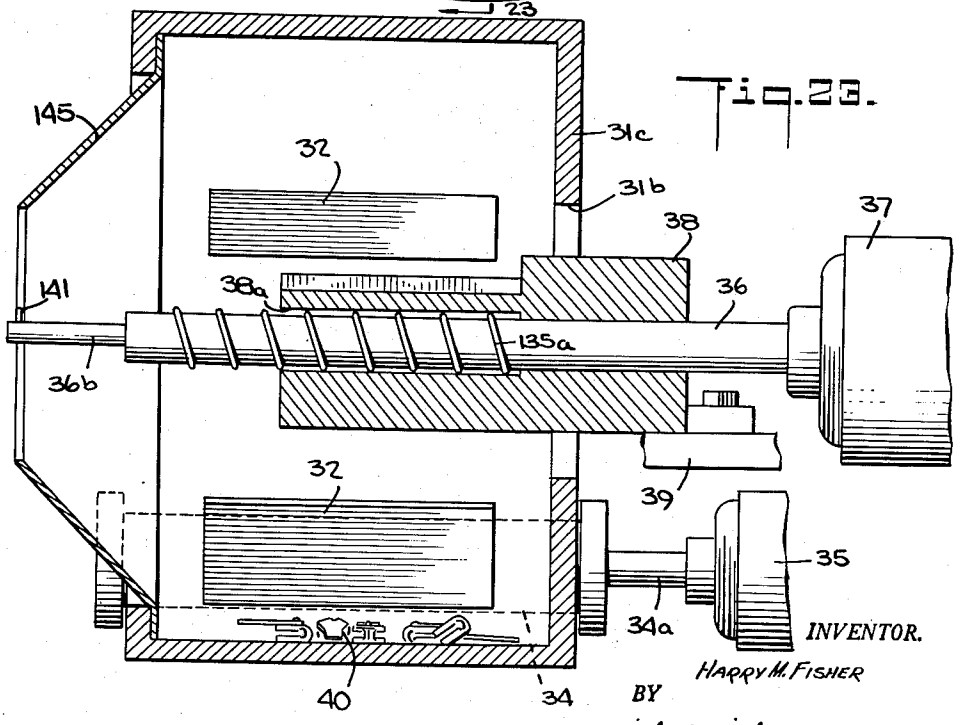


Fig. 23.



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Fig. 25.

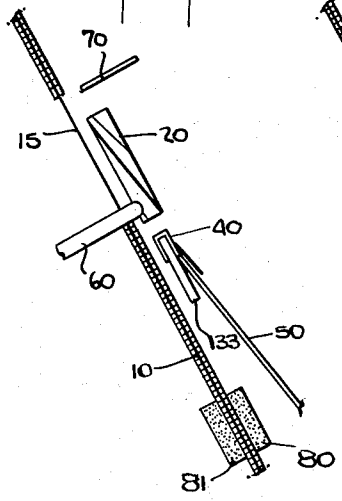


Fig. 26.

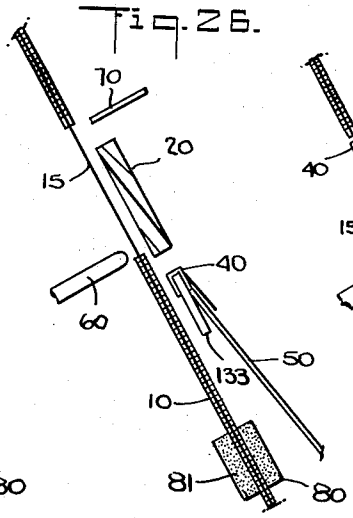


Fig. 27.

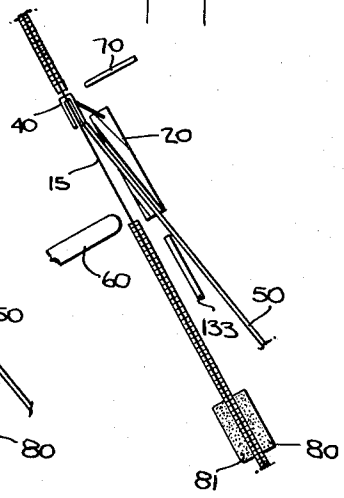


Fig. 28.

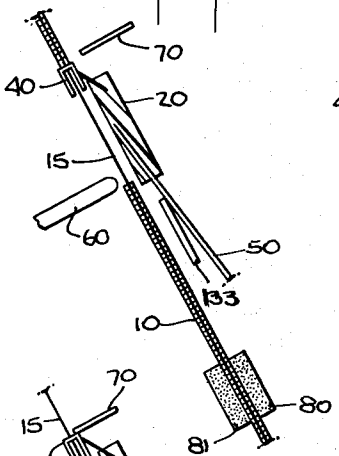


Fig. 29.

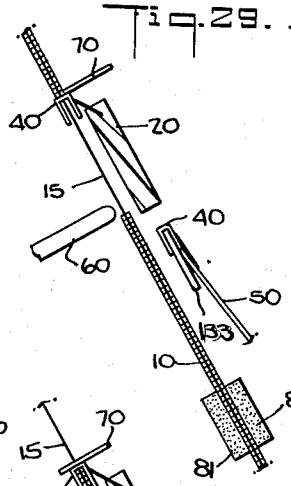


Fig. 30.

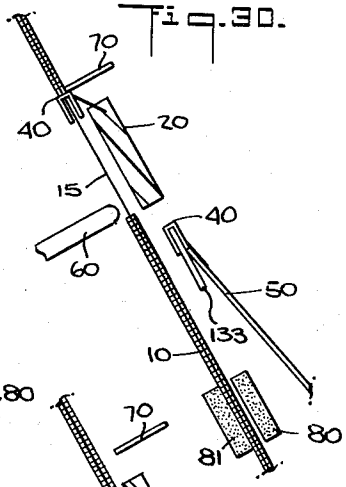


Fig. 31.

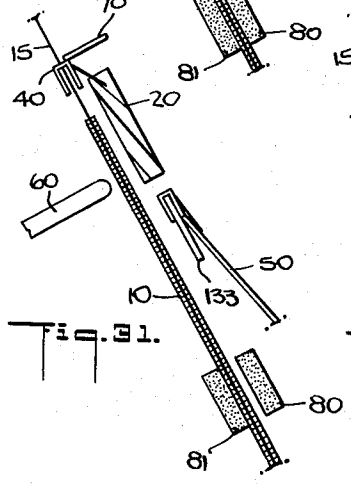


Fig. 32.

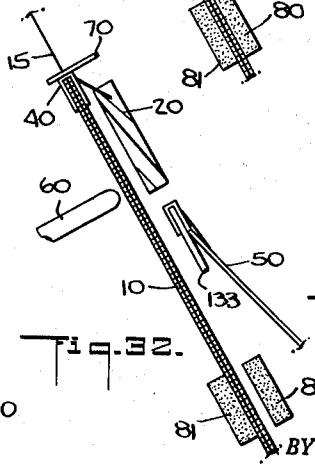
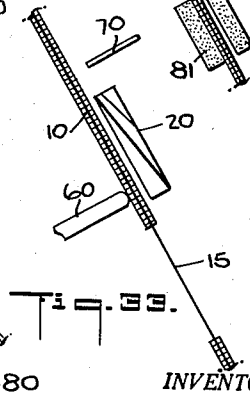


Fig. 33.



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United States Patent Office 3,116,544
Patented Jan. 7, 1964

3,116,544
SLIDER APPLICATOR

Harry M. Fisher, 157—36 22nd Ave., Whitestone, N.Y.

Filed Nov. 28, 1960, Ser. No. 72,012
8 Claims. (Cl. 29—208)

This invention relates to an improved machine for automatically applying sliders to zippers.

In accordance with commercial practice, zippers are first produced by making a web consisting of two tapes in side by side relationship and having interlocking scoops on the adjacent edges thereof. A scoop cutting machine is employed to cut away the scoops at successive spaced intervals to form slits in the web. A bottom stop is then applied to one end of each length of scoops between successive slits.

One object of this invention is to provide a machine which then automatically applies sliders to the web after it has been slit and after the bottom stops have been applied thereto.

Another object of this invention is to provide a machine of the above-described type having improved feed means for supplying sliders to the apparatus for inserting the sliders on the web.

Another object of this invention is to provide improved means responsive to the movement of the web for actuating the slider applying mechanism.

Another object of this invention is to provide an improved sensitive, mechanically operated clutch for control of the slider applying mechanism.

Another object of this invention is to provide a slider applying mechanism in the form of a flexible, reciprocal push rod, together with cooperating means which act upon the slider and web to insure that the slider will be properly applied to the web.

Other objects and advantages of this invention will become apparent from the following description, in conjunction with the annexed drawing, in which a preferred embodiment of the invention is disclosed.

In the drawing:

FIG. 1 is a fragmentary perspective view showing primarily the drive means for the operating parts of the invention.

FIG. 1A is a fragmentary perspective view of the slider applying mechanism, the parts being positioned corresponding to the instant in a cycle of operation when the clutch is about to be actuated to start the actual application of a slider to the web.

FIG. 2 is a fragmentary top plan view of the slider applying mechanism.

FIG. 3 is a fragmentary section on line **3**—**3** of FIG. 2.

FIG. 4 is a perspective view similar to FIG. 1, showing the slider as it is applied to the web.

FIG. 5 is a view similar to FIG. 2, but corresponding to the condition of the operating parts shown in FIG. 4.

FIG. 6 is a fragmentary section on line **6**—**6** of FIG. 5.

FIG. 7 is a fragmentary section on line **7**—**7** of FIG. 5.

FIG. 8 is a fragmentary section on line **8**—**8** of FIG. 5.

FIG. 9 is a fragmentary perspective view, partly broken away, of the parts shown in FIG. 4, of the machine, showing a detail of the mechanism for guiding the slider onto the web.

FIG. 10 is a perspective view similar to FIGS. 1 and 4, but showing the parts of the slider applying mechanism after the slider has been applied to the web.

FIG. 10A is a perspective view similar to FIG. 10, showing a detail of a drag member for retarding the movement of the slider relative to the movement of the web.

FIG. 11 is a diagrammatic view of the drive mechanism for the web.

FIG. 12 is a bottom perspective view of a gripper employed in the drive mechanism of FIG. 11*a*.

FIG. 13 is a fragmentary perspective view of the one-revolution clutch assembly which is part of the control mechanism for the slider applying mechanism. The clutch is shown in disengaged position.

FIG. 14 is a fragmentary sectional view of the clutch of FIG. 13, taken along the axis of rotation of the clutch.

FIG. 15 is a fragmentary elevational view of the clutch mechanism, as taken in the direction of line **15**—**15** of FIG. 14.

FIG. 16 is a fragmentary sectional view on line **16**—**16** of FIG. 14.

FIG. 17 is a view similar to view **13**, showing the clutch in engaged condition.

FIG. 18 is a view similar to FIG. 14, but with the parts in the position of FIG. 17*a*.

FIG. 19 is a fragmentary section on line **19**—**19** of FIG. 18.

FIG. 20 is a diagrammatic elevational view of the one-revolution clutch mechanism, in conjunction with a clamping mechanism for the web.

FIG. 21 is a perspective view of the hopper in accordance with this invention, the hopper being shown partly broken away.

FIG. 22 is a section on line **22**—**22** of FIG. 21.

FIG. 23 is a section on line **23**—**23** of FIG. 22.

FIG. 24 is a fragmentary perspective view of the slider track of the hopper, viewed from the opposite direction as in FIG. 21.

FIGS. 25–33, inclusive, are diagrammatic side elevational views of the slider applying mechanism, showing successive stages of the operation thereof.

GENERAL DESCRIPTION

Upon reference to the drawings in detail, it will be noted that the views thereof show a machine for applying sliders **40** to a web **10**. Said web **10** consists of a pair of tapes **11** and **12** extending longitudinally in side by side relationship. Said tapes **11** and **12** respectively have beads **11***a* and **12***a* on the proximate longitudinal edges thereof. Scoops **13** are mounted on said beads **11***a* and **12***a* in the usual way and in the usual interlocked relationship. At selected intervals, the scoops have been cut away in the usual way to provide slits **15** between successive lengths of web to which the scoops **13** remain applied. At the front or leading end of each slit **15**, a bottom stop **14** has been applied to the interlocked scoops **13**, in the usual manner.

Slider **40** is conventional and comprises upper plate **41** and lower plate **42**, connected at the front thereof and maintained in general parallel relationship by transverse yoke **43***b*. Plate **41** has downwardly extending side flanges **41***a*. Plate **42** has upwardly extending side flanges **42***a*. The flanges **41***a* and **42***a* on each side of the slider oppose each other and are spaced from each other. Said plates **41** and **42** are shaped to provide outwardly extending slider wings **40***a* and **40***b*, with the respective flanges **41***a* and **42***a* terminating at the front of said wings **40***a* and **40***b*. Said wings **40***a* and **40***b* are located intermediate the front and rear end of slider **40**.

Slider **40** has a rear longitudinally extending throat portion **43** between plate **41** and **42**, and this throat **43** meets at its front end with throat portions **43***a* which diverge outwardly from throat **43** in the areas of wings **40***a* and **40***b* and extend to the edges of the slider on either side of yoke **43***b*.

A bar-like operating handle or tab **44** is fastened to upper plate **41** by means of lateral pivots **44***a* which

extend through a lateral opening in a loop or ear **45** formed on the top of plate **41** near the front thereof. Tab **44** is movable about the axis of said pivots **44***a*.

The propulsion mechanism for web **10** is located at the front of the machine and is shown diagrammatically in FIG. 11. Said propulsion mechanism includes an upper sprocket chain **90** mounted on front and rear sprocket wheels **91** and **92** which are turnable about lateral axes, and a lower chain **93** which is mounted on front and rear sprockets **94** and **95** which are turnable about lateral axes. The two chains **90** and **93** respectively have longitudinally and horizontally extending opposing and proximate runs **90***a* and **93***a*. Said chains **90** and **93** respectively carry grippers **96**.

Said gripper **96** has a vertical leg which is mounted on the sprocket by means of sprocket pins **99***a* extended through leg openings **99**, and has a laterally extending foot **97** which is rounded and which has a central longitudinal through groove **97***a*. These feet are oriented so that the foot on chain **90** bears against the top of the web and the foot on chain **93** bears against the bottom of the web while they are in their respective runs **90***a* and **93***a*.

Web **10** is carried between the opposing horizontal runs **90***a* and **93***a* and is gripped by the feet **97**. A suitable drive means (not shown) for the sprockets may be provided so as to carry the horizontal runs **90***a* and **93***a* longitudinally forwardly, and hence convey web **10** forwardly in the direction of arrow **98**.

The slider applying mechanism **59** is located rearwardly of the web propulsion mechanism. Slider applying mechanism **59** includes a pusher **50** operated by cam **52** and other parts and adapted to feed a slider **40** between a pair of blocks **20** located forwardly of cam **52**. Blocks **20** serve as a longitudinally extending guide for slider **40**. Web **10** is carried forwardly between a pair of clamps **80** and **81** located below cam **52** and hence through blocks **20** and toward the propulsion mechanism. Actuating lever **60** of one-way clutch mechanism **61** is located below blocks **20** and bears against web **10** and is adapted to extend through slit **15**. When lever **60** extends through slit **15** and strikes the trailing end thereof, it actuates the one-revolution clutch mechanism **61**, which in turn controls the action of the clamps **80** and **81** to retard the movement of web **10**, and also actuates the pusher **50** to propel a slider **40** onto the web **10**. Gate **70** is located forwardly of blocks **20** and is adapted to bear against web **10** so as to check temporarily the movement of slider **40** after movement of web **10** resumes, so as to position slider **40** longitudinally properly on web **10**.

Slider **40** is supplied from hopper **31**, by means of bar **133**, to position for movement of the slider by pusher **50** onto web **10**.

THE SLIDER FEED

Hopper **31** and track **30** are shown in detail in FIGS. 21–24 inclusive.

Hopper **31** is in the form of a cylindrical, laterally extending drum having an outer end wall **31***c* and which may be loaded by any suitable means (not shown). Said hopper **31** has four equally circumferentially extending vanes extending radially inwardly of the outer periphery thereof and designated by the reference numeral **32**. Said cylindrical drum **31** rests at its bottom on a pair of longitudinally spaced, laterally extending rollers **33** and **34** which are made of rubber or the like. These are mounted on any suitable shafts, turnably supported by any suitable means. Roller **34** is mounted on shaft **34***a*, which is the output shaft of motor **35**, said motor **35** being the driving means causing rotation of roller **34** and hence of the drum, with roller **33** serving as an idler roller. Arrow **31***a* designates the direction of turning of the drum **31**.

Lateral shaft **36** extends turnably through an opening **31***b* in the outer end wall of drum **31**, and is co-axial with drum **31**. Shaft **36** is the output shaft of motor **37** and is driven at a constant rate of speed, in the direction of arrow **36***a*. Sleeve **38** on shaft **36** extends through opening **31***b* and into the interior space of drum **31**. Sleeve **38** is fixably attached by bracket **39** to any suitable frame (not shown), and shaft **36** is turnable within the bore of sleeve **38**.

The inner end portion of sleeve **38**, within hopper **31**, is cut away so as to provide a flat surface **130** which is downwardly rearwardly inclined. Plate **131** is fixed to the upper end of surface **130** and extends above said face and is substantially co-planar therewith. The ends **132** of plate **131** are bent so as to extend rearwardly thereof and define a trough.

The inner end portion of sleeve **38**, within hopper **31**, is cut away so as to provide a downwardly rearwardly inclined surface having a flat upper portion **130***a*, a flat intermediate portion **130** and a flat lower portion **129**. Surface **130** is forwardly offset with respect to surface **129**. Surface **130***a* is forwardly offset with respect to surface **130**. Plate **131** is fixed to surface **130***a* and extends above sleeve **38**. The front face of plate **131** is downwardly rearwardly inclined and is co-planar with surface **130**. Plate **131** has side flanges which extend longitudinally rearwardly thereof.

Bar **133** is fixed to surface **129**, by means of screws **128**, and extends above surface **129** in spaced parallel opposition to surface **130**. The upper edge of bar **133** is spaced below plate **131**. The upper portion of bar **133**, designated by the reference numeral **134**, is of reduced thickness to define a shoulder **135** extending rearwardly from the reduced portion **134**.

Sliders **40** fall off one or another of the vanes **32** and some of them fall from vane **32**, in the direction of arrow **32***a*, onto the rear inclined surface of plate **131** and from this tend to fall onto the bar **133**. Some sliders **40** become oriented so that their two plates **41** and **42** become located respectively against the front and rear surface of bar portion **134**, above shoulder **135**, with yoke **43** resting upon the upper edge of bar portion **134**. In the correct position, as above-described, the tongue or handle **44** rests against the lower portion of bar **133**.

The inner portion **38***a* of the bore of sleeve **38** is of enlarged diameter so as to be spaced from shaft **36**. Bore portion **38***a* is laterally co-extensive with surfaces **130***a*, **130** and **129**. Spiral wire **135***a* is wound upon shaft **36**, within bore portion **38***a*, in the form of a helix having its pitch disposed as shown in FIG. 23. Shaft **36** and wire **135***a* extend inwardly beyond the inner end of sleeve **38**. Surface **130** is tangential to shaft **36**, so that a portion of wire **135***a* is exposed through surface **130**. The clearance between wire **135***a* and the inner peripheral wall of sleeve **38** is insufficient to accommodate a wall **41** or **42** of slider **40**, so that slider **40** becomes located between successive turns of wire **135***a*. Accordingly, the rotation of shaft **36** causes the various sliders to be moved inwardly laterally by said wire **135***a*, in the direction of arrow **137**.

In some instances, as illustrated in FIG. 21, the slider may become reversely oriented so that its wall **41** is located against the front base of bar portion **134**, and its wall **42** against the outer face of bar portion **134**. In that case, the tongue or handle **44** lies over the top of bar portion **134**, as illustratively shown in FIG. 21.

Lever **138** is located on the front side of bar **133** and is connected thereto, intermediate its ends, by means of longitudinal pivot **139**. Spring **140**, connected between bar **133** and lever **138** laterally outwardly of pivot **139**, urges the outer end of lever **138** downwardly. Lever **138** is spaced from bar **133**, sufficiently so that the wall **42** of a slider **40** properly oriented upon bar **133** extends clearingly between lever **138** and bar **133**, as shown in FIG. 24. However, in the case of an improperly oriented slider, its ear **45** rides upon the top edge of lever **138**.

Frusto-conical out spout **145** is fixed, at its end of largest diameter, to the inner end of hopper **31** and extends inwardly thereof. Spout **145** keeps sliders from being thrown out of the hopper and serves to permit additional sliders to be supplied to the hopper. Shaft **36** extends into the outer end of spout **145**. Shaft **36**, has an extension **36***b* of reduced diameter which extends through and slightly beyond the inner end of spout **145**. Bar **133** extends through spout **145** and beyond the inner end of shaft extension **36***b*. Radial pin **141** is fixed to shaft extension **36***b* at the inner end of spout **145**. Optionally, pin **141** may be shifted outwardly.

Once per revolution of shaft **36**, pin **141** sharply strikes the upper edge of lever **138**, inwardly of pivot **139**, so as to cause movement of the outer end of lever **138** in the upward direction of arrow **142**. This causes the disoriented slider **40** to be raised from bar **133** sufficiently so that it is thrown clear thereof.

Accordingly, from the foregoing, it will be apparent that a succession of laterally aligned and properly oriented sliders are fed inwardly on the inclined bar **133**.

The extreme inner end or bar portion **134**, as shown in FIG. 2, is provided with a stop **150** on the rear face thereof, against which the innermost slider **40** abuts, in position to be fed to web **10**. Near the inner end of plate **133**, the thickened portion has a longitudinal slot **151** for reception of the flexible pusher rod **50**. Plate **152** is fixed to the rear face of bar **138** by means of screws **153**, overlies slot **151** and retains the flexible pusher bar **50** in that slot. The handle or tab **44** extends sufficiently rearwardly of the slider main body so as to extend over the top of plate **152** and hence be clear of bar **50**.

The web **10** passes longitudinally adjacent the front face of bar **133**, and is axially aligned with the axis of slot **151** and the axis of bar **50**.

DRIVE MEANS FOR SLIDER APPLYING MECHANISM

The sliders being automatically supplied to position for application to the web, drive means are provided, including one-revolution clutch **61** which is actuated by the movement of the web itself, for the slider applying mechanism. The one-revolution clutch and drive means for the slider applying mechanism are shown in detail in FIG. 1 and in FIGS. 13–20, inclusive.

Lateral shaft **62** is turnably extended through a bore of frame plate **63**, the bearings for the ends of shaft **62** being omitted.

Pulley **64** is turnably mounted on shaft **62** outwardly of and adjacent to frame member **63**. Pulley **64** is coupled by belt **161** to pulley **161***a* on output shaft **161***b* of motor **161***c*, so that pulley **64** turns continuously. Shaft **62** ordinarily does not turn, but is coupled by one-revolution clutch **61** to pulley **64**. Pulley **64***a* on shaft **62** drives pulley **64***b* on lateral shaft **53**, by means of belt **64***c*. Shaft **53** is the drive shaft for pusher **50**, gate **70** and web clamps **80** and **81**.

Shaft **62** has an elongated groove **62***a* in the periphery thereof. An elongated bar **65** extends laterally slidably in groove **62***a* and also extends radially outwardly thereof and extends slidably through and turnably through the bore of frame member **63** through which shaft **62** extends, this opening being shaped to permit turning movement of pin **65** and shaft **62**. Spring **66** is positioned within groove **62***a* and extends in the direction of length thereof between the inner end of the groove and the inner end of bar **65**, so as to urge pin **65** outwardly. Bar **65** has an inner, radially outwardly extending head **65***a*. In the inner position of the elongated bar **65**, it clears pulley **64**. In the outer position of bar **65**, it enters one of a plurality of recesses **64***a* in the inner face of pulley **64**.

Wedge **67** is fixed to the inner face of frame member **63**. This wedge **67** has a relatively thick base and a trailing knifelike portion having a surface **67***a* which is inclined from the inner end of the wedge **67** to the frame member **63**, in the manner shown in FIG. 15.

In the starting position of clutch **61**, shown in FIGS. 13–16, inclusive, the thick portion of wedge **67** is located between head **65***a* and frame **63**, forcing rod **65** inwardly so that it is clear of slots **64***a*. In this position, the clutch is disengaged.

Collar **68** is fixably mounted on shaft **62**. Elongated lever **60** is connected to the inner face of collar **68** by means of eccentric lateral pivot **68***a*. Said elongated lever **60** is urged in the direction of its length, in the direction of arrow **60***a*, by means of spring **69** connected between lever **60** and frame member **160**. The free convex upper or rear end of elongated lever **60**, designated by the reference numeral **60***b*, bears against the lower faces of the scoops **13** of web **10**. When elongated lever **60** becomes aligned with slit **15**, it enters same, as shown in FIG. 17, causing a slight movement of collar **58** in the direction of arrow **68***b*. This causes head **65***a* to move clearingly ahead of wedge **67**, as shown in FIG. 17, and also FIG. 19, and this permits movement of rod **65** into a slot **62***a*. This causes engagement of the clutch, and shaft **62** turns in unison with pulley **64**.

During the revolution of shaft **62**, there is slight further advancement of elongated lever **60** through slit **15**, and then withdrawal of elongated lever **60** from slit **15** as the result of the movement of collar **68**. At the end of the revolution of shaft **62**, the head **65** rides on the inclined cam surface **67***a* and returns to its starting position against the thickened portion of the wedge, thereby withdrawing pin **65** from slot **64***a*. This disengages the clutch after one revolution. As will be explained further below, during this one revolution of the clutch, the slider is applied to the web and the web is advanced so that as the lever **60** returns to its initial position, it is again blocked by scoops **13**.

THE SLIDE MOUNTING MECHANISM

Shaft **53**, which is controlled by one-revolution clutch **61**, has fixedly mounted thereon cam **52**. Cam **52** is located behind bar **133** and generally is cylindrical with a cut away peripheral portion **52***a* which opposes movable clamp **81**. Web **10** passes between clamp **81** and lower fixed clamp **80** under cam **52**. While cam **52** is revolving, its main cylindrical portion rides against clamp **81** and depresses it so as to clamp web **10** between clamps **80** and **81** and prevent web **10** from moving while slider **40** is applied to it. Shortly before the revolution of cam **52** ends, cam portion **52***a* clearingly opposes clamp **81**, which rises out of clamping position, as by the action of a spring (not shown).

Pusher **50** is made of stiff but flexible material, such as hard rubber, and has a rear boss or enlargement **151** with a lateral bore through which pin **51** extends, pin **51** being fixed in axially offset position to an end face of cam **52**. Pusher **50** is forwardly downwardly inclined. Pusher **50** is first pushed forwardly (FIG. 4) and then returned to its initial rearward position (FIG. 2) once per revolution of cam **52**. Spring **152** is connected between pusher **50** and frame member **153** and urges pusher **50** downwardly.

Tapes **22** pass under blocks **20** adjacent the lower faces thereof and are held against them by the plates **22** which are supported by the frame by any suitable means. Said blocks **20** are supported at their remote rear corners by respective vertical pivots **21**. Spring **22***a* connects the two blocks near the front and at the top and urges the fronts thereof toward each other. Control lever **60** is adapted to extend upwardly between the blocks **20** adjacent the rear thereof.

Said blocks **20** have a cut out or notch **20***a* in their respective lower proximate edges extending the full length thereof to accommodate the respective tape beads **11***a*.

Vertical grippers **23**, are fixed to the bottoms of the respective blocks **20** near the proximate edges thereof and near the front thereof, and grip the respective tapes

11 and 12. The remote side gripper faces 23*c* extend longitudinally and are also inclined so as to define a bottom edge of each gripper which extends longitudinally. Hence, grippers 23 do not impede longitudinal movement of tapes 11 and 12. When the front ends of the blocks 20 are swung outwardly in the direction of arrow 24, each gripper 23 correspondingly moves in the direction of 23*a* and carries the tape outwardly.

Said blocks 20 have slots 25 in the respective proximate faces thereof. Each said slot 25 extends to the rear face of block 20 and is there located intermediate the top and bottom faces of block 20. Said slot 25 is of uniform height. The remote vertical walls 25*a* of slots 25 are inclined toward each other in the forward direction and terminate at the respective proximate faces of blocks 20, rearwardly of their front faces, so that slots 25, provide forwardly converging throats. In addition, slot 25 is forwardly downwardly inclined so that at its termination it extends to the bottom face of block 20.

When bar 60 extends through a slit 15, clutch 61 is actuated. However, meanwhile, the momentum of the zipper carries it to a point at which bar 60 abuts the rear end of slit 15, stopping the web. Clamps 80 and 81 then clamp the web, and bar 60 withdraws, from slit 15. The forwardly moving pusher 50 is positioned so that it then enters the space between plate 152 and bar 133 (bending approximately), in longitudinal alignment with inner slider 40. Pusher 50 pushes slider 40 into and through throats 25. Slider 40 forces blocks 20 away from each other (arrow 24). The vertical grippers 23 moving in the corresponding directions of arrows 23*a* carry the tapes and beads outwardly. As shown in FIG. 9, the beads 11*a* and 12*a* become respectively located between the jaws of the slider, with slider web 43*b* between the beads. FIG. 10 shows the slider after the push has been completed and with the slider beyond the blocks 20. These now move back in the direction of arrows 24*a*, and the pusher is shown moving back in the direction of arrow 50*b*. The pins 23 carry the fabric inwardly to locate the beads further between the sides of the jaws of the slider.

It is to be noted that pins or grippers 23 spread the tapes to a distance apart greater than the width of web 43*b* at the point of discharge of web 43*b* from throats or channels 25. The level of slider 40 at the point of discharge of web 43*b* is such that the plane of blank or web 10 is intermediate flanges 41*a* and 42*a*. Accordingly, since slit 15 is tapered forwardly of the point of discharge of web 43*b*, upon continued forward movement of slider 40, beads 11*a* and 12*a* must be located between the slider jaws, with web 43*b* spreading the beads apart slightly. The return movement of blocks 20 causes the beads to be carried still further between the slider jaws.

Gate 70 is supported by guide 71 forwardly of blocks 20. Gate 70 is in the form of a vertically and laterally extending plate which is vertically slidable in guide 71. Gate 70 is coupled to cam 150 on shaft 53 by any suitable means, such as the diagrammatically shown flexible cable assembly 70*a*.

During the revolution of cam 150, gate 70 is maintained in lowered position in which it frictionally abuts web 10 while slider 40 is being mounted on web 10 forwardly of blocks 20. In this position of gate 70, slider 40 abuts the rear of gate 70 and cannot advance during initial resumed forward movement of web 10 (following release of clamp 81). Accordingly, web 10 moves forwardly relative to slider 40 until slider 40 is received on the scoops behind slit 15. During the remainder of the cycle, cam 150 raises gate 70, clearing slider 40, and slider 40 advances with web 10.

In the movement of the slider between the blocks 20, the tape beads are caught between the wings 40*a* and 40*b* and in the diverging throat portions 43*a*. After the slider advances forwardly of the blocks and they are returned to their normal position, it is possible that the tapes may not properly enter the rear portion of the throat between the

flanges 41*a* and 42*a*. However, the forward movement of the web relative to the slider causes the slider to be adjacent the rear portion of the slit, at which point the tapes are pulled together by the succeeding scoops and hence are forced into the throat portion 43.

SUMMARY OF OPERATION

The diagrammatic views, FIGS. 25–33, show the sequence of operation of the machine.

As web 10 advances, elongated lever 60 rides against its lower face (FIG. 33), clamps 80 and 81 being disengaged, pusher 50 being in its rearward position and gate 70 being elevated.

Elongated lever 60 enters slit 15 actuating clutch 61. The momentum of web 10 carries it forwardly for engagement of elongated lever 60 against the rear end of slit 15, thereby locating web 10 positively in its desired index positions. Clamp 80 is moved to clamping position, the parts now being in the condition of FIG. 25.

Elongated lever 60 is then withdrawn from slit 15 (FIG. 26).

Pusher 50 then moves forwardly until slider 40 is mounted on web 10 (FIG. 27).

Pusher 50 then begins to move rearwardly (FIG. 28).

Pusher 50 returns to its rearward position as gate 70 is lowered (FIG. 29).

Clamp 80 is raised (FIG. 30).

Web 10 moves forwardly again, but slider 40 is blocked by gate 70 (FIG. 31). Elongated lever 60 is clear of web 10.

Slider 40 is now received by the scoops rearwardly of slit 15 (FIG. 32).

Gate 70 is raised, and slider 40 and web 15 move forward in unison with elongated lever 60 now frictionally abutting the scoops of web 10 (FIG. 33).

From the foregoing, it will be seen that I have provided a fully automatic machine having friction drive means for moving the slitted web forwardly and a finger which enters a slit and stops the web, thereby actuating a one-revolution clutch which actuates mechanism for clamping the web, withdrawing the finger from the slit, applying a slider to the web, blocking forward movement of the slider, unclamping the web so that it can advance again and finally permitting forward movement of the slider. The machine also has improved simple means for automatically feeding sliders to position for their application to the web. The machine is simple to operate and can be operated at high speed.

While I have disclosed a preferred embodiment of the invention and have indicated various changes, omissions and additions which can be made therein, it will be apparent that various other changes, omissions and additions may be made in the invention without departing from the scope and spirit thereof.

I claim:

1. Machine for applying sliders to a zipper blank at scoop interruption intervals thereof, said machine comprising a longitudinally extending guide for said sliders having a rear entrance and a front exit, means for indexing said blank longitudinally forwardly to position scoop interruption intervals successively opposite said front exit, means for positioning a slider behind said entrance in position for longitudinal movement through said entrance, a rotary lateral shaft behind said entrance, a collar fixedly mounted on said shaft, a flexible, elongated pusher bar, a lateral pivot coupling one end of said pusher to said collar at a point offset from said shaft, said pusher bar extending forwardly downwardly from its pivot in longitudinal alignment with said guide, the front of said pusher being located behind said slider in one turned position of said shaft, a support for the front of said pusher, spring means urging said pusher downwardly intermediate its ends, and means for rotating said shaft, said pusher being adapted to be moved forwardly along said support and into said guide and to push said slider through said guide

and out of said front exit, said guide means being positioned and adapted to eject said slider in said scoop interruption interval with the tapes of said blank between the slider jaws.

2. Machine for applying sliders to a zipper blank, said zipper blank comprising elongated side-by-side tapes and scoops, said tapes having scoop intervals wherein said tapes respectively have said scoops secured thereto with the scoops of one tape interlocking with the scoops of the other tape, said tapes also having scoop interruption intervals in which they are free of scoops, said machine comprising friction means for drawing said blank longitudinally forwardly, an elongated lever, means mounting said elongated lever transversely movably opposite said blank, spring means urging one end of said elongated lever against said blank, the path of travel of said blank being such as to locate said elongated lever against said scoops and then for said elongated lever to enter a scoop interruption interval, and means responsive to the movement of said elongated lever into said scoop interruption interval for sequentially clamping said blank against movement thereof, retracting said elongated lever from said scoop interruption interval, applying said slider to said tapes in said scoop interruption interval and unclamping said blank.

3. Machine for applying sliders to a zipper blank, said zipper blank comprising elongated side-by-side tapes and scoops, said tapes having scoop intervals wherein said tapes respectively have said scoops secured thereto with the scoops of one tape interlocking with the scoops of the other tape, said tapes also having scoop interruption intervals in which they are free of scoops, said machine comprising friction means for drawing said blank longitudinally forwardly, a rotary lateral shaft, a drive pulley turnably mounted on said shaft, means for coupling said shaft to said pulley, means including cam means uncoupling said shaft and said pulley in one turned position of said shaft, a collar on said shaft, an elongated lever, means pivotally mounting said elongated lever on a face of said collar at a point offset from the axis of said shaft for causing oscillatory movement of said elongated lever by rotation of said shaft, said elongated lever opposing and being adapted to abut said blank, spring means urging one end of said elongated lever against said blank, the path of travel of said blank being such as to locate said elongated lever against said scoops with said shaft and said pulley then uncoupled and then for said elongated lever to enter a scoop interruption interval, said shaft being thereby turned sufficiently to be coupled to said pulley, the momentum of said blank being sufficient for engagement of said elongated lever against the trailing end of said scoop interruption interval to stop said blank, means coupled to said shaft for clamping said blank against movement during at least the first part of a revolution of said shaft, said elongated lever being adapted to be held withdrawn from said scoop interruption interval during the shaft revolution, and further means coupled to said shaft for applying said slider to said tapes in said scoop interruption interval while said blank is clamped.

4. Machine according to claim 3, said blank clamping means being adapted to release said blank after said slider is applied thereto and before the end of the shaft revolution, said machine also comprising a gate positioned in front of said slider applying means and movable transversely between a first position adjacent a face of said blank and a second position spaced therefrom, said gate being positioned longitudinally forwardly of said slider when it is first applied to said blank, and means mounting said gate in its first position during the first part of the resumed movement of said blank after release of said clamping means, said gate being then positioned to be struck by and retard the slider relative to said blank until said slider is in a scoop interruption interval, and maintaining said gate in its second position during the remainder of the revolution of said shaft, said gate being then positioned to be cleared by the slider.

5. Machine for applying sliders to a zipper blank, said zipper blank comprising elongated side-by-side tapes and scoops, said tapes having scoop intervals wherein said tapes respectively have said scoops secured thereto with the scoops of one tape interlocking with the scoops of the other tape, said tapes also having scoop interruption intervals in which they are free of scoops, said machine comprising means for indexing said blank in successive longitudinal movements so as to locate said scoop interruption means successively at a fixed location, means for applying a slider to said blank in the tape interruption interval at said fixed location while said blank is stationary, a gate positioned in front of said slider applying means and movable transversely between a first position adjacent a face of said blank and a second position spaced therefrom, said gate being positioned longitudinally forwardly of said slider when it is first applied to said blank, and means maintaining said gate in its first position during the first part of the indexing movement, said gate being then positioned to be struck by and retard the slider relative to said blank until said slider is in a scoop interruption interval, and maintaining said gate in its second position during the remainder of said indexing movement, said gate being then positioned to be cleared by the slider.

6. Machine for applying sliders to a zipper blank, said zipper blank comprising elongated side-by-side tapes and scoops, said tapes having scoop intervals wherein said tapes respectively have said scoops secured thereto with the scoops of one tape interlocking with the scoops of the other tape, said tapes also having scoop interruption intervals in which they are free of scoops; said machine comprising a pair of blocks in side-by-side relationship, on either side of a longitudinal axis, said blocks having rear transverse pivots, spring means biasing the fronts of said blocks toward each other, said blocks having proximate side faces formed with forwardly downwardly extending, converging channels adapted to receive the sides of said slider, means for pushing a slider forwardly through said channels, the width of said slider being greater than the normal spacing of the side walls of said channels forwardly of said pivots so that said blocks are spread by said slider, grippers on the bottoms of said blocks, means for positioning said blank in longitudinal extension and in alignment with said axis under said blocks with said blocks overlying a scoop interruption interval and with said grippers respectively frictionally abutting said tapes, said grippers being adapted to spread said tapes when said blocks are spread, said channels being positioned for discharge of said slider into the resulting widened scoop interruption interval on the level of said scoops for reception of said scoops between the jaws of said slider.

7. Machine for applying sliders to a zipper blank at a scoop interruption interval thereof, comprising means for indexing said blank longitudinally forwardly to position scoop interruption intervals successively at a fixed station, a forwardly upwardly inclined, laterally elongated bar at the rear of said station, one end of said bar overlying said blank, hopper means for mounting sliders on said bar with the slider jaws slidably abutting its respective front and rear faces and the slider web slidably resting on the top of said bar, means for sliding said sliders successively into longitudinal alignment with said blank, slider guide means at said station in front of said bar and longitudinally aligned with said blank, means behind said bar for pushing the slider longitudinally aligned with said blank off said bar and through said guide means, said guide means being positioned and adapted to eject said slider in said scoop interruption interval with the tapes of the blank between the slider jaws.

8. Machine according to claim 7, said guide means comprising a pair of side-by-side blocks vertically pivoted at the remote rear corners thereof, spring means urging the fronts of said blocks together, guide channels in the

proximate sides of said blocks which converge forwardly and are forwardly downwardly inclined and exit at the front in said scoop interruption interval, and grippers on the bottom of said blocks frictionally engaging the blank tapes, said blocks being adapted to receive said slider in said channels and to be spread thereby to spread said tapes and enlarge said scoop interruption interval and to discharge said slider with its web between said tapes and with said tapes between the slider jaws.

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