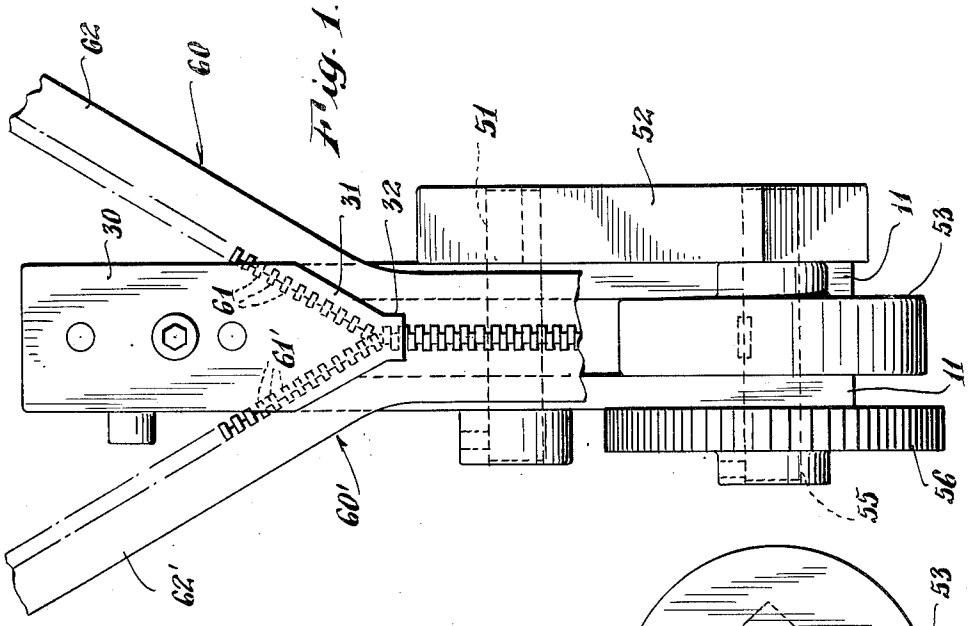
Oct. 14, 1952 F. H. ROJAHN 2,613,433

APPARATUS FOR INTERLOCKABLY ASSEMBLING FASTENER STRINGERS

Filed Dec. 27, 1948 2 SHEETS—SHEET 1

Fig. 1.



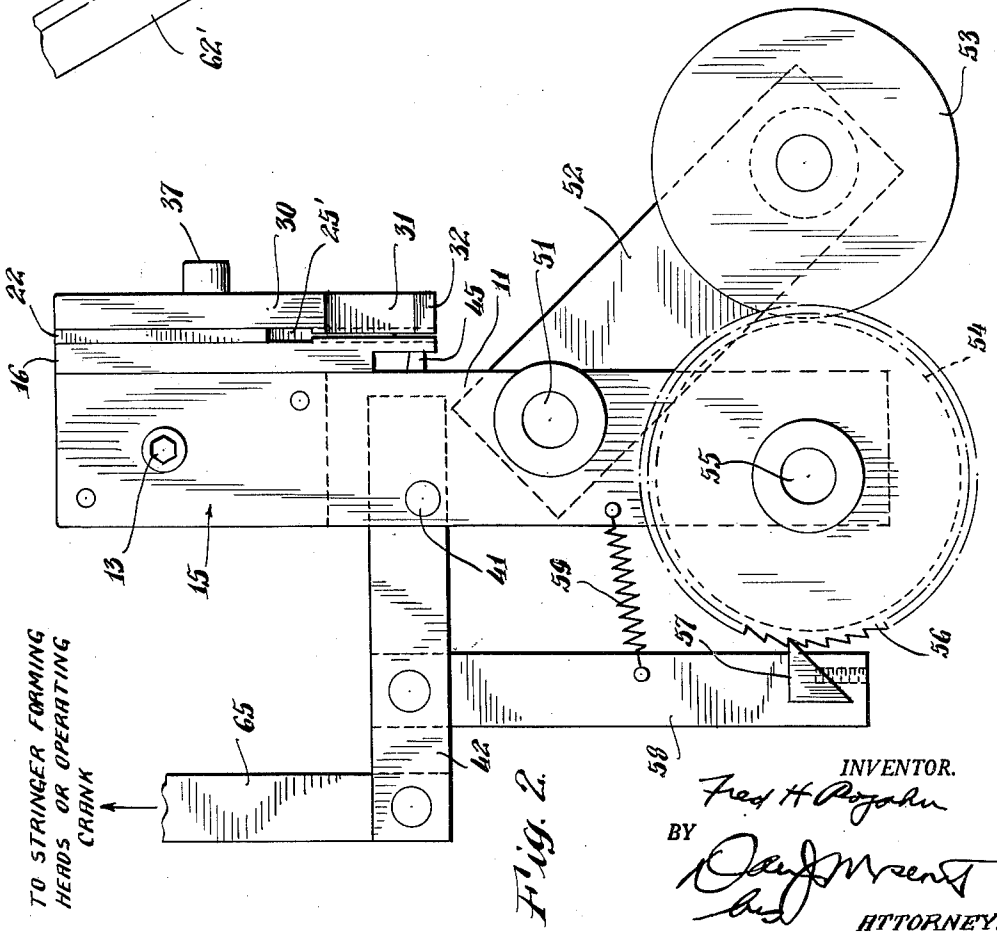


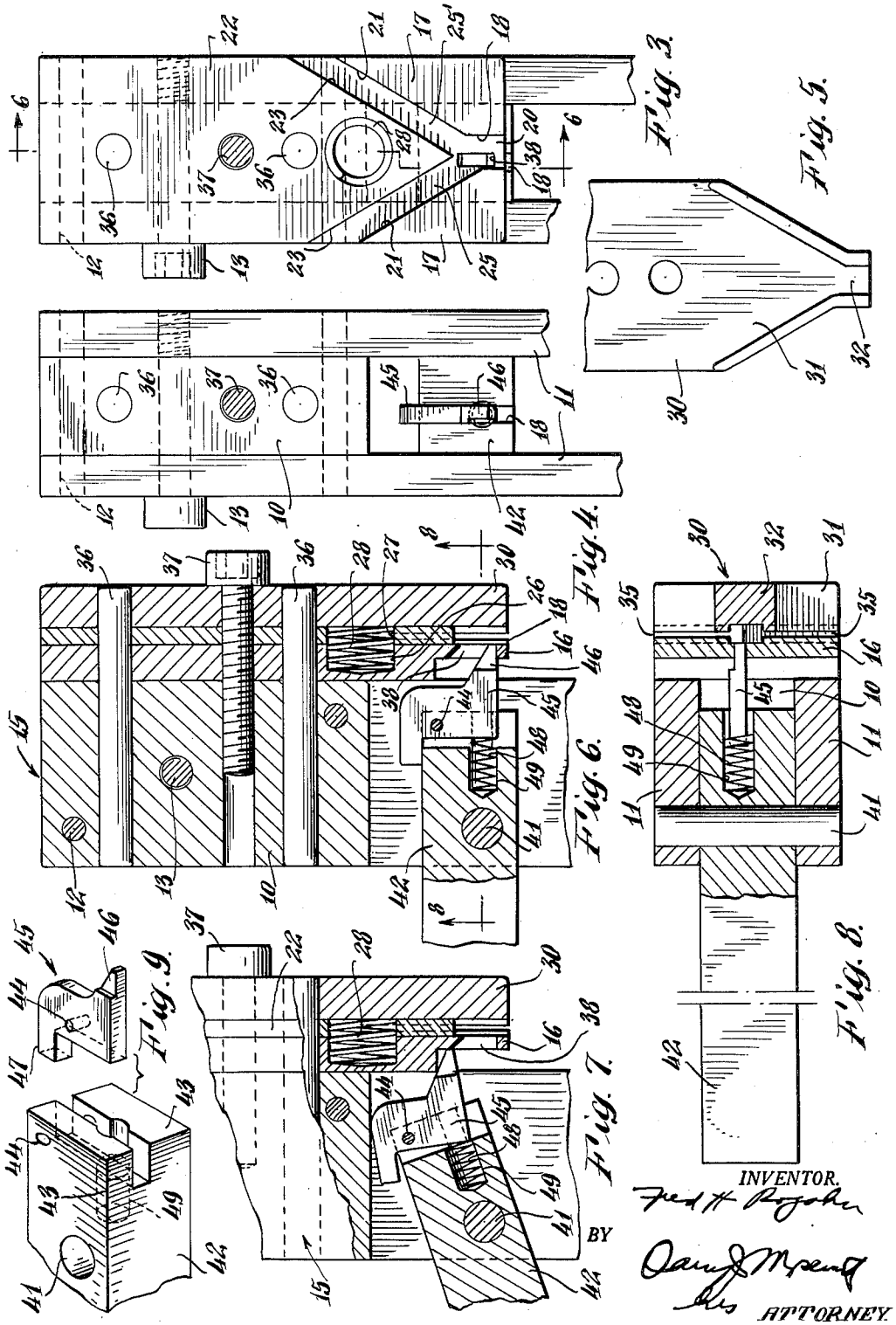
Fig. 2.

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APPARATUS FOR INTERLOCKABLY ASSEMBLING FASTENER STRINGERS

Filed Dec. 27, 1948 2 SHEETS—SHEET 2



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APPARATUS FOR INTERLOCKABLY ASSEMBLING FASTENER STRINGERS

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4 Claims. (Cl. 29—208)

1

This invention relates to the manufacture of slide fasteners and, more particularly, to an improved apparatus for interlockingly assembling, preparatory to mounting a slider thereon and securing top and bottom stops thereto, a pair of continuous fastener equipped stringers in which the projections on the meshing fasteners are presented forwardly of the heads thereof.

Specifically, it is an object of this invention to provide an improved apparatus for interlockingly assembling a pair of continuous fastener equipped stringers, the projections on the heads of the fasteners of which are presented forwardly of the heads, in a "straight-line" operation as they are delivered from the forming mechanism in synchronism with the same.

In the manufacture of slide fasteners, one of the main difficulties in effectuating "straight-line" operation lies in the fact that the projections on the heads of the fasteners as the stringers are produced extend forwardly of the fasteners, i. e. the stringers are of the "backward mesh" type and as such, the opposing fastener elements of the respective stringers are not readily interlockable by passage through a Y-shaped channel of the contour of a "slider." It has been standard practice up to the present time, in interlockingly assembling fastener equipped continuous stringers as they are delivered with the head projections of the fasteners extending forwardly from the forming mechanism, to wind the same upon rolls and thereafter, through unwinding the rolls, to present the fastener elements with the projections of the fastener elements now disposed rearwardly thereof for intermeshing by passage through a Y-shaped channel.

In order to obviate this difficulty and to permit "straight-line" operation and the intermeshing of the fasteners of stringers as they are fed from the forming machine with the projections extending forwardly of the heads, in synchronism with the forming mechanism, the apparatus of the present invention includes means for guiding a pair of stringers along individual paths into converging relation at a meshing point with their fastener elements in opposed relation, mechanism for drawing the meshed stringers away from the meshing point and means operable in synchronism with the stringer forming heads, to successively engage each individual fastener element of one stringer and move it into firm engagement with a matching element of the other stringer.

A feature of the apparatus is the provision of a third path along which the joined stringers are drawn, with each of the two converging paths

2

intersecting the third path at different points. With this arrangement one stringer is bent in advance of the other to spread its adjacent elements apart, thus facilitating entry therebetween of the elements of the other stringer. In combination with the aforementioned element engaging means, this insures a firm and positive meshing of the stringer elements. More specifically, the apparatus includes a base plate having a longitudinal groove or channel for receiving the meshed fastener elements, and a pair of mutually converging grooves intersecting the longitudinal groove at spaced points. A cover plate overlies and completes the enclosure of the grooves and has lips parallel thereto but spaced from the base plate to form slots for the tapes of the stringers to project laterally from the channels.

A slot is formed in the longitudinal channel in alignment with the fastener elements of one stringer. Beneath this slot an arm is mounted for oscillation in the plane of the slot and carries a pawl projectable through the slot to engage the fastener elements overlying the slot. The pawl is oscillatable on the arm, and means are provided for projection of the pawl during forward movement thereof while allowing retraction of the pawl during its reverse movement. Means such as a link or rod, connect the pawl supporting arm to the reciprocable stringer forming heads or their operating crank means so that the pawl is reciprocated in the slot in timed relation with the passage of the stringers therealong to individually engage successive fastener elements on one stringer to assure their interlocking with mating elements on the other stringer.

A pair of friction rollers or the like are provided to draw the interlockingly assembled stringers along the third groove away from the meshing point. A ratchet may be provided on one roller and operated by a second pawl, secured to the arm supporting the first pawl, to impart step-by-step rotation to the rollers to operate them in synchronism with the stringer forming mechanism.

With the foregoing in mind, it is an object of this invention to provide an improved slide fastener assembling machine.

Another object is to provide such a machine having means insuring positive meshing of the fastener elements.

A further object is to provide such a machine having means for separating the elements of one stringer in advance of their meeting the elements of the other stringer to insure interfitting of the fastener elements.

These and other objects, advantages, and novel features of the invention will be apparent from the following description and the accompanying drawings. In the drawings:

Fig. 1 is a front elevation view of the slide fastener assembling machine;

Fig. 2 is a side elevation view thereof;

Fig. 3 is a partial front elevation view of the machine with the cover plate removed;

Fig. 4 is a partial rear elevation view of the machine;

Fig. 5 is a rear view of a portion of the cover plate;

Fig. 6 is a longitudinal section on the line 6—6 of Fig. 3;

Fig. 7 is a view similar to Fig. 6 showing the pawl in the retracted position;

Fig. 8 is a transverse sectional view on the line 8—8 of Fig. 6; and

Fig. 9 is a perspecitve view of the pawl and its supporting arm.

Referring to the drawings, the machine, which is mounted in advance of the stringer forming heads of a "Double Head" slide fastener apparatus, includes a central supporting block 10 having a pair of slide plates 11, 11 secured thereto and extending downwardly therefrom. Block 10 and plates 11 are maintained as an aligned unit by pins 12 and bolt 13 to form a unit 15 having a coplanar supporting surface for the working parts of the machine, such unit being supported in alignment with the discharge end of the stringer forming heads.

On the outer surface of unit 15 is a first plate 16 having raised, trapezoidal portions 17 having inner edges 18, 18 defining a longitudinal groove 20, and sloping edges 21, 21. Immediately outwardly of plate 16 is a second plate 22 having a triangular lower end with edges 23, 23 parallel to edges 21, 21, and cooperating therewith to form grooves or channels 25, 25'. It will be noted that groove 25 intersects groove 20 at a point slightly to the rear of the intersection of grooves 20 and 25'. Plates 16 and 22 have concentric apertures 26, 27 forming a seat for a coil spring 28.

Immediately outward of plate 22, is a cover plate 30 having a generally triangular lower end 31 with a rectangular nose 32. The sloping sides of end 31, and the longitudinal edges of nose 32 have inturned flanges 33, 33 and 34, 34. The inner surfaces of these flanges are coplanar with edges 21, 21 and 18, 18, respectively, and the flanges are spaced forwardly from portions 17, 17 to provide slots 35, 35. Plates 16, 22 and 30 are aligned by pins 36, 36 and held assembled to unit 15 by stud 37.

A longitudinal slot 38 is formed through plate 16 in the base of channel 20. Behind this slot, a pin 41 extends transversely of plates 11 to support an arm 42 for oscillation in the plane of slot 38. Arm 42 has spaced ribs 43 carrying a pin 44 oscillatably supporting a pawl 45 having a nose 46 projecting into slot 38 and a stop 47 engageable with arm 42. A spring 48 in a socket 49 in arm 42 biases pawl 45 counter-clockwise (as viewed in the drawings) with stop 47 limiting movement of the pawl.

Downwardly from unit 15, a pin 51 extends through plates 11 to support a depending arm 52 having a stringer engaging roller 53 rotatable on its outer end. Roller 53 is horizontally aligned with a second roller 54 keyed to a shaft 55 extending through arms 52 and having a ratchet 56 fixed on its outer end. Ratchet 56 cooperates with a pawl 57 on an arm 58 extending from arm 42. A spring 59 holds pawl 57 against ratchet 56.

The machine operates in the following manner. Stringers 60, 60', each comprising fastener elements 61, 61' clamped to the forward edges of tapes 62, 62' by the respective heads of the "Double Head" mechanism, are discharged from such mechanism into grooves 25, 25' respectively. These grooves are large enough in cross-section to receive the fastener elements, with the tapes 62, 62' projecting laterally through slots 35, 35 between projections 17, 17 and the inturned flanges of cover 30. The "Double Head" mechanism feeds the two tapes along the grooves toward the meshing point.

As the stringers pass along grooves 25, 25', stringer 60 enters groove 20 slightly before stringer 60' enters this groove. Due to the advance bending of stringer 60, its elements 61 are separated to facilitate the entrance of elements 61' therebetween. As both stringers enter groove 20, the fastener elements are meshed to join the stringers into a slide fastener unit.

A link or rod 65 connects arm 42 to the "Double Heads" or to their operating crank means so that pawl 45 is reciprocated in slot 38 in synchronism with the stringer forming operation and the passage of stringers 60, 60' into interlocking engagement at the meshing point. As pawl 45 moves downwardly, it is held in a projected position by spring 48, and successively engages each element 61' of stringer 60' to mesh these elements positively with elements 61 of stringer 60. As pawl 45 moves rearwardly, spring 48 is compressed, permitting retraction of the pawl.

Each time arm 42 moves upwardly, pawl 57 advances ratchet 56 and roller 54 by the distance between two fastener elements. Roller 54, together with roller 53, thus pulls the assembled stringers away from the meshing point in synchronism with the stringer formation and meshing. While the machine has been described as having the stringers travel downwardly, this is relative only, and the apparatus may be changed in position by 90 degrees to provide horizontal travel.

The described machine assures positive engagement of the fastener elements in a simple, efficient manner, and is particularly effective in backwards mesh arrangements. The advance opening of the elements of one stringer assures interfitting of the fastener elements, and positive meshing of the latter is effected by the synchronized movement of pawl 45.

Although I have shown a slot 38 at that side of the groove 20 leading from channel 25', it is within the province of this invention to form such slot 38 in groove 20 leading from either channel 25' or 25; it is further within the province of the invention to provide two such slots 38, respectively disposed in groove 20 and leading from channels 25 and 25' and in such embodiment two pawls 45 are mounted for reciprocation in synchronism with the "Double Head" mechanism through the link or rod connections with the fastener element attaching mechanisms or the actuating means therefor in the "Double Head."

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles thereof, it should be understood that the invention may be otherwise embodied without departing from such principles.

I claim:

1. Slide fastener assembling apparatus, for intermeshing a pair of stringers carrying equi-

spaced interfitting fastener elements having identical structure as they are delivered from a forming mechanism, comprising, in combination, means forming a pair of intersecting channels of equal width for guiding a pair of stringers into converging relation at a meshing point with their attached fastener elements in opposed relation; mechanism for drawing the intermeshed stringers away from the meshing point; reciprocable pawl means extending into said channels at the meshing point; and means for positively moving said pawl in the direction of movement of the stringers, in synchronism with said forming mechanism to successively engage each individual element of one stringer and move it into firm engagement with a matching element of the other stringer; said pawl being arranged to slide over the fastener elements in its return movement.

2. Slide fastener assembling apparatus, for intermeshing a pair of stringers carrying interfitting fastener elements as they are delivered from a forming mechanism, comprising, in combination, a base plate having a longitudinally extending groove formed in its upper surface and a pair of mutually converging grooves intersecting said longitudinal groove, each of said converging grooves being arranged to receive the fastener elements on one of a pair of stringers arranged on said base plate with their fastener elements in opposed relation; a cover plate cooperating with said base plate to complete the enclosure of said grooves and having downturned lips parallel to said grooves and terminating above said base plate to provide slots for the stringer tapes to extend laterally from said grooves; said converging grooves guiding the stringers into converging relation to intermesh the opposed fastener element; a slot in said longitudinal groove underlying the fastener elements on one stringer; an arm mounted beneath said longitudinal groove for oscillation in the plane of said slot; a pawl oscillatably mounted on the upper end of said arm and projectable through said slot to engage the fastener elements of said one stringer; means retaining said pawl extended during movement thereof by said arm forwardly along said slot, said means providing for retraction of said pawl on reverse movement of said arm; mechanism for drawing the intermeshed stringers away from the meshing points; and means for reciprocating said arm and pawl in synchronism with said forming mechanism to successively engage said pawl with each individual element of one stringer and move it into firm engagement with a matching element of the other stringer.

3. Slide fastener assembling apparatus for intermeshing a pair of stringers carrying interfitting fastener elements as they are delivered from a forming mechanism, comprising, in combination, a base plate having a longitudinally extending groove formed in its upper surface and a pair of mutually converging grooves intersecting said longitudinal groove at spaced points therealong, each of said converging grooves being arranged to receive the fastener elements on one of a pair of stringers arranged on said base plate with their fastener elements in opposed relation; a cover plate cooperating with said base plate to complete the enclosure of said grooves and

having downturned lips parallel to said grooves and terminating above said base plate to provide slots for the stringer tapes to extend laterally from said grooves; said converging grooves guiding the stringers into converging relation to intermesh the opposed fastener element; a slot in said longitudinal groove underlying the fastener elements on one stringer; an arm mounted beneath said longitudinal groove for oscillation in the plane of said slot; a pawl oscillatably mounted on the upper end of said arm and projectable through said slot to engage the fastener elements of said one stringer; means retaining said pawl extended during movement thereof by said arm forwardly along said slot, said means providing for retraction of said pawl on reverse movement of said arm; mechanism for drawing the intermeshed stringers away from the meshing point; and means for reciprocating said arm and pawl in synchronism with said forming mechanism to successively engage said pawl with each individual element of one stringer and move it into firm engagement with a matching element of the other stringer; the spaced intersections of said converging grooves with said longitudinal groove effecting a bending of one stringer to spread its fastener elements before meeting the other stringer to facilitate intermeshing of the fastener elements.

4. Slide fastener assembling apparatus, for intermeshing a pair of stringers carrying equispaced interfitting fastener elements having identical structure as they are delivered from a forming mechanism, comprising, in combination, a pair of intersecting channels of equal width for guiding a pair of stringers into converging relation at a meshing point with their attached fastener elements in opposed relation; a third channel for guiding the intermeshed stringers away from the meshing point; one of said pair of channels intersecting said third channel in advance of the other of said pair of channels, whereby one of the stringers is bent to spread its fastener elements before meeting the other stringer to facilitate intermeshing of the fastener elements; mechanism for drawing the intermeshed stringers away from the meshing point; means operable in synchronism with said forming mechanism to engage at least each element of one stringer and move it into firm engagement with a matching element of the other stringer; and means operable by said last named means to activate said drawing mechanism in synchronism with the forming mechanism.

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