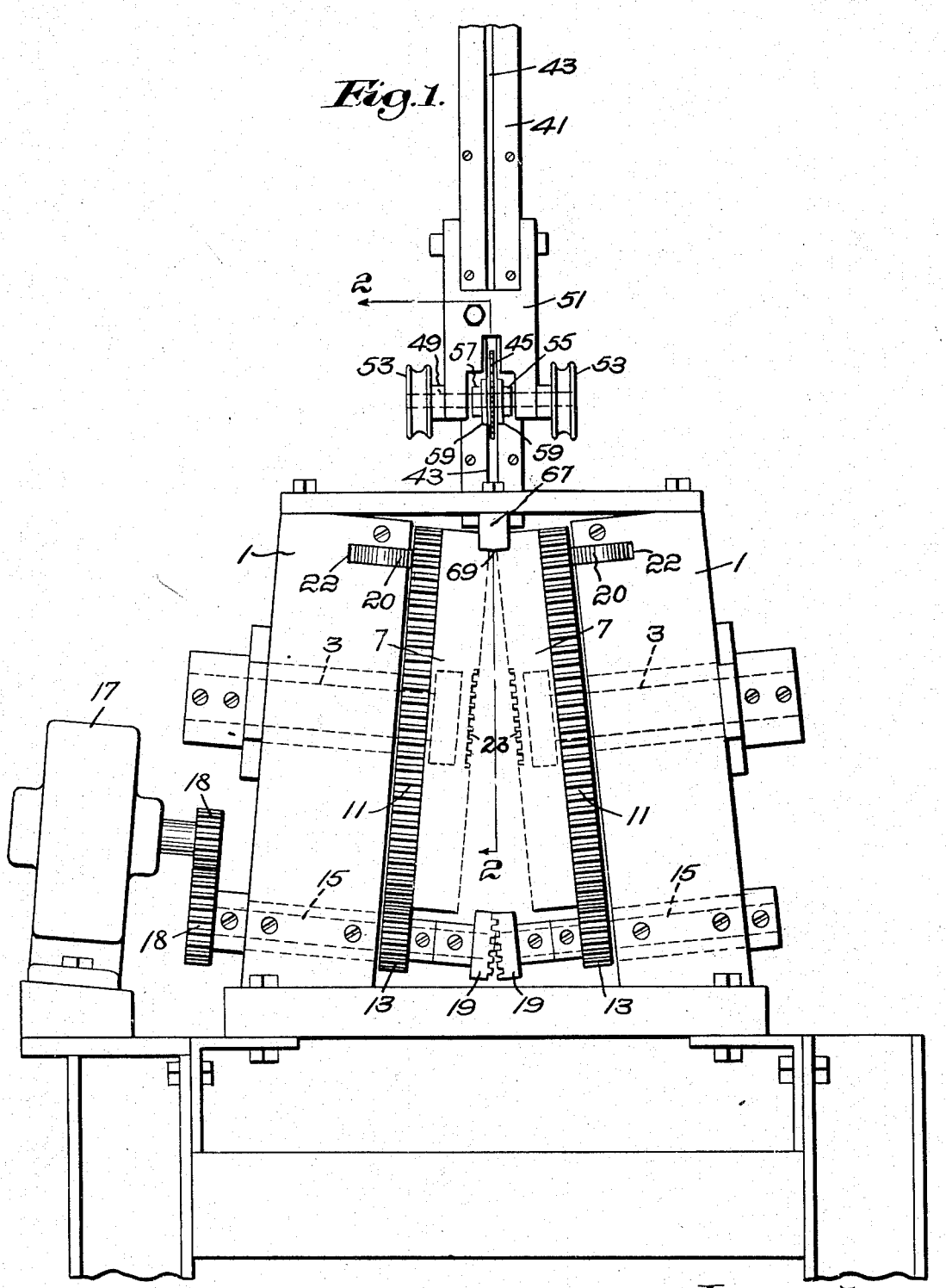
Nov. 23, 1943. M. WINTERHALTER 2,335,034

SEPARABLE SLIDE FASTENER ASSEMBLING MACHINE

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Fig. 1.

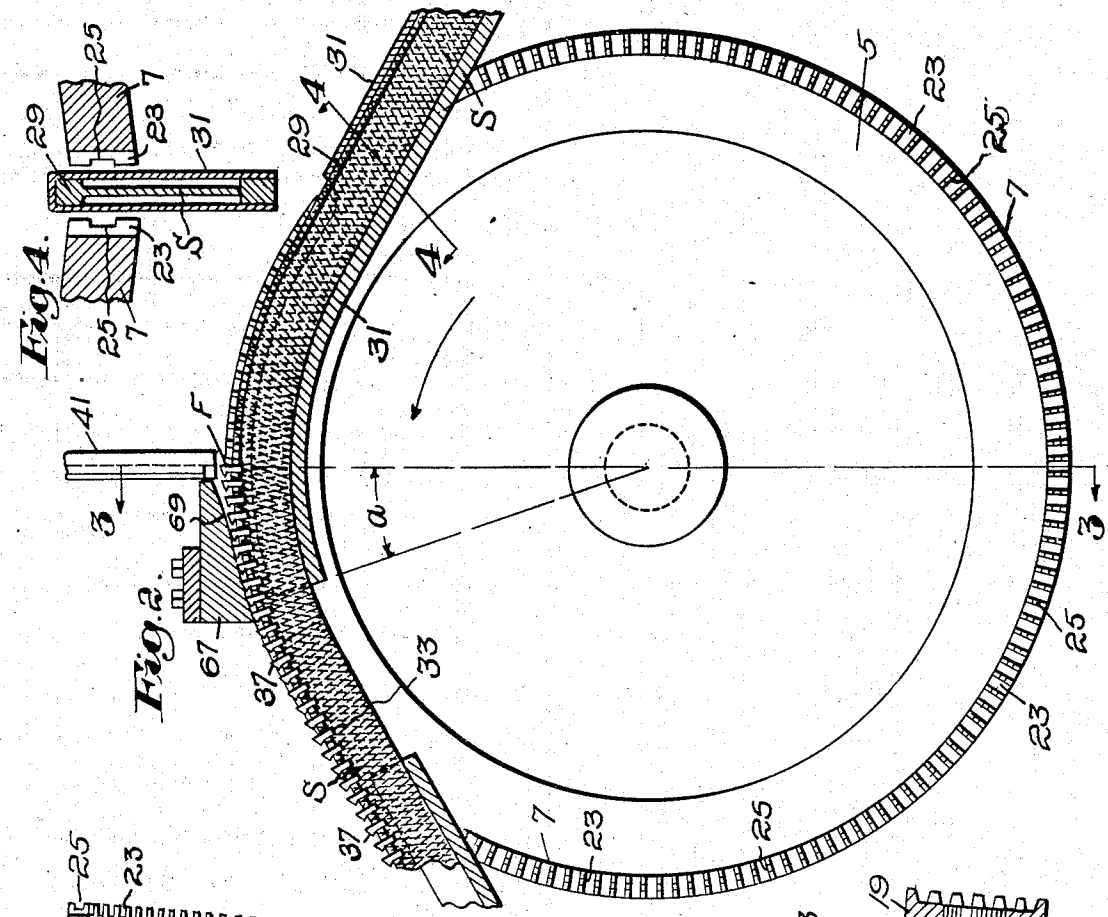


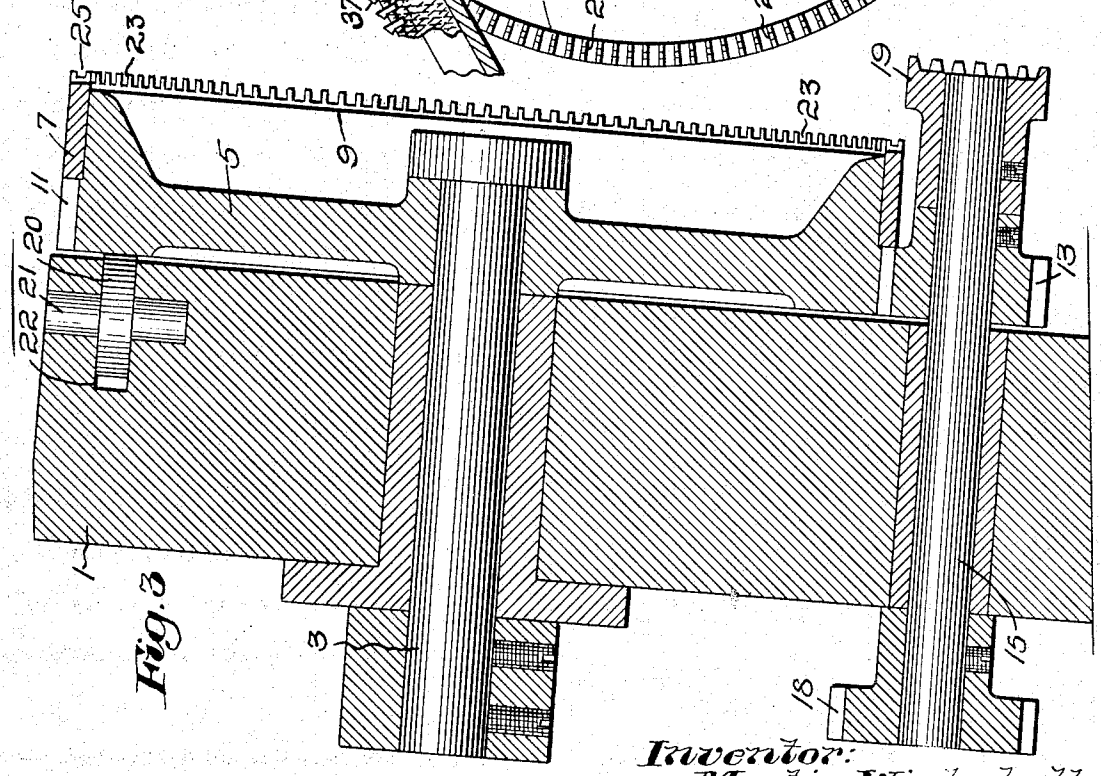
Inventor:
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Nov. 23, 1943. M. WINTERHALTER 2,335,034

SEPARABLE SLIDE FASTENER ASSEMBLING MACHINE

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SEPARABLE SLIDE FASTENER ASSEMBLING MACHINE

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Fig. 5

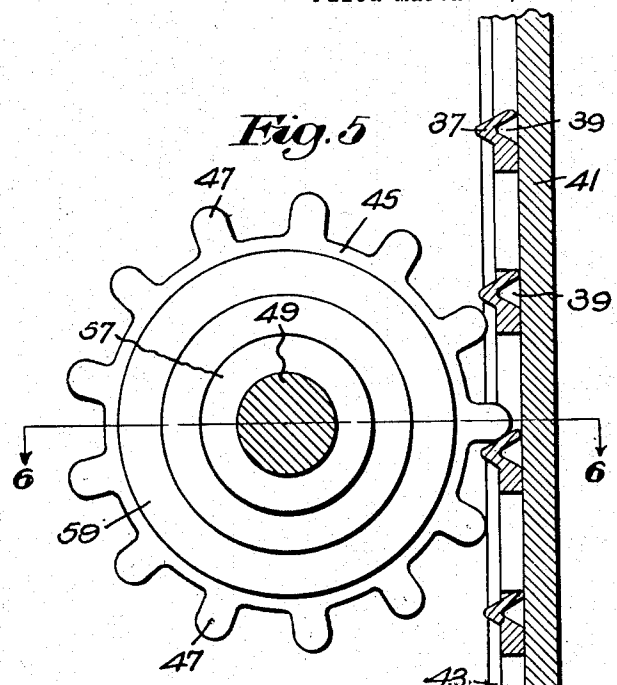


Fig. 6

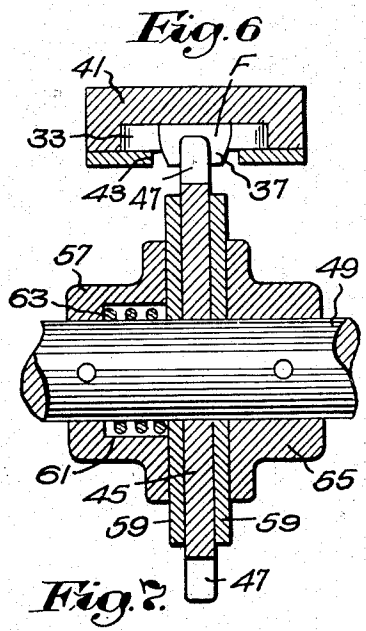
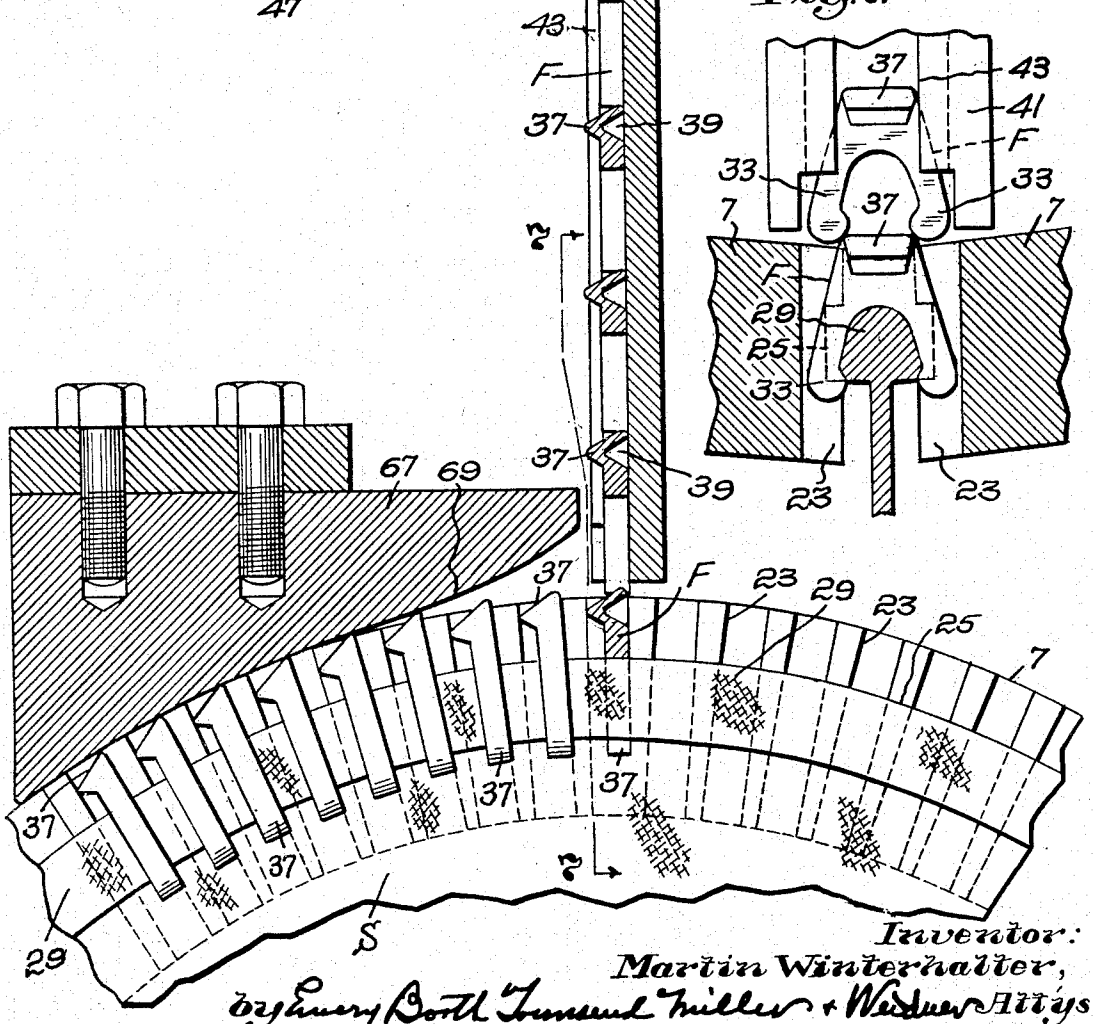


Fig. 7



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SEPARABLE SLIDE FASTENER ASSEMBLING MACHINE

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Fig. 8

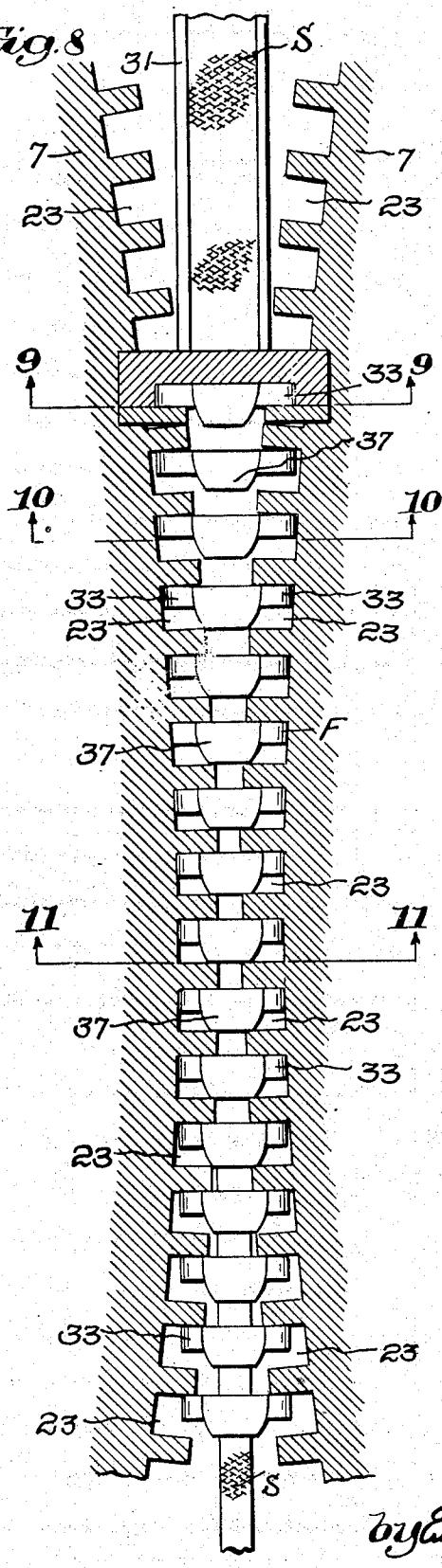


Fig. 9.

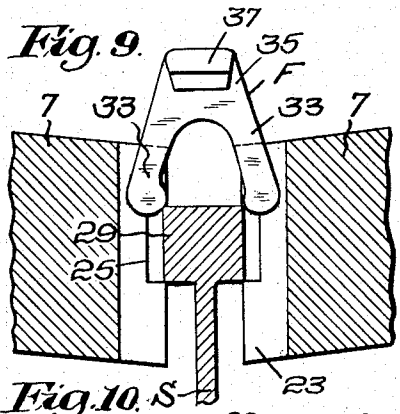


Fig. 10.

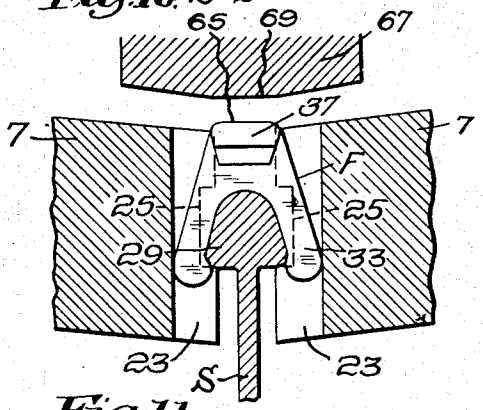
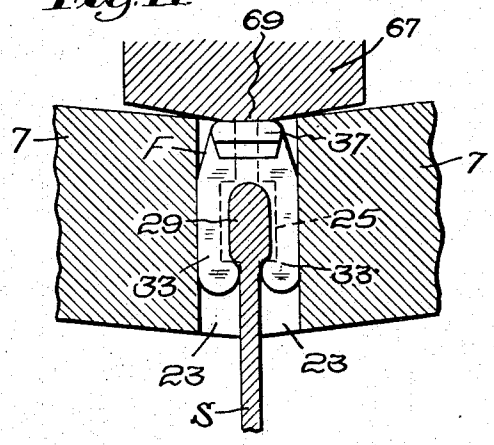


Fig. 11.



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UNITED STATES PATENT OFFICE

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SEPARABLE SLIDE FASTENER ASSEMBLING MACHINE

Martin Winterhalter, Morcote-Castello, near Lugano, Switzerland

Application March 22, 1941, Serial No. 384,710

13 Claims. (Cl. 153—1)

My invention relates to processes and machines for assembling the fastener elements of a separable slide fastener with the stringer of the fastener.

The invention will be best understood from the following description of a process and machine according to the invention, when read in the light of the accompanying drawings, while the scope of the invention will be more particularly pointed out in the appended claims.

In the drawings—

Fig. 1 is a front elevation of a machine according to the invention, with parts omitted;

Fig. 2 is a section on the line 2—2 of Fig. 1, with parts omitted;

Figs. 3 and 4 illustrate details of construction, being sections on the lines 3—3 and 4—4 of Fig. 2 on an enlarged scale;

Fig. 5 is a section on the line 2—2 of Fig. 1 on an enlarged scale, with parts omitted;

Figs. 6 and 7 are sections on the lines 6—6 and 7—7 of Fig. 5, with parts omitted; and

Figs. 8 to 11 more or less diagrammatically illustrate the operation of placing the fasteners on and securing them to the stringer, Fig. 8 being an approximate development of the notched rings hereinafter referred to with the fastener elements in assembled relation therewith and the stringer, and Figs. 9 to 11 being approximately sections on the lines 9—9, 10—10 and 11—11 of Fig. 8.

Referring to the drawings, the machine illustrated comprises a suitable support on which is mounted a pair of opposed fixed blocks 1. Rotatably mounted in each block is a spindle 3, the ends of the spindles projecting from the opposed faces of the blocks and there fixedly carrying rotary disk-like parts 5 (Figs. 2 and 3). As shown, the rotary parts 5 fixedly carry peripheral rings 7 the outer edges of which project beyond the opposed faces 9 of the parts 5, as clearly shown in Fig. 3. As shown, the spindles 3 are at a wide angle to each other close to 180 degrees so that the facing outer edges of the two rings are at a relatively narrow angle to each other. By such construction corresponding points on the outer faces of the rings, when the latter rotate, gradually approach each other to a point of minimum separation at the upper portions of the rings and then gradually recede from each other. Conveniently, as indicated in Fig. 2, the point of minimum separation may be at an angle from the vertical, with the members 5 rotating in the direction of the arrow shown in said figure. For rotating the disk-like members 5 and the rings 7 carried by them, the former are shown as provided with annular series of peripheral gear teeth 11. With these gear teeth mesh pinions 13 fixedly carried on the ends of spindles 15 rotatably mounted in the blocks 1. The left hand spindle 15, as shown in Fig. 1, is driven by an electric motor 17 through the meshing spur gears 18, while the left hand spindle 15 drives the right hand spindle 15 through the meshing bevel gears 19. For resisting longitudinal thrusts on the spindles 3 the blocks 1 may carry one or more roller disks 20 bearing against the sides of the parts 5 opposite the projecting edges of the rings 7. These roller disks, as shown, are journalled on spindles 21 carried by the blocks, and are received in slots 22 in the faces of the blocks.

In the illustrated embodiment of the invention each of the facing edges of the rings 7 is formed with an arcuate series of notches 23, which series, as shown, extend throughout the entire circumferences of the rings. The edges of the rings at the spaces between the notches 23, as illustrated, are notched circumferentially of the rings, as shown at 25, the several notches 25 on each ring operatively forming a groove extending throughout the length of the series of notches 23.

The stringer S with which the fastener elements F are to be assembled is, as illustrated, provided at one longitudinal edge with a bead 29, this stringer and its bead being formed conveniently of textile material, as will be well understood by those skilled in the art. A length of stringer is guided by the fixed slotted guide 31 (Figs. 2, 4 and 8) into operative relation with the groove formed by the notches 25, so that through a considerable arc at the upper portions of the rings 7, as viewed in Figs. 2 and 3, opposite sides of the edge bead 29 of the stringer will be received in the opposite notches 25, as shown in Fig. 9.

The fastener elements F fed to the stringer, as illustrated in Figs. 5, 7, 8 and 9, have spread apart jaws 33 projecting from a head 35, which latter carries a projection 37, the ends of the projections 37 of the elements on each stringer in the assembled fastener being adapted to be received in recesses 39 (Fig. 5) in adjacent elements on the opposite stringer, as will be well understood by those skilled in the art. It will be understood, however, that various other forms of fastener elements may be employed.

Above the rings 7 is shown a vertically extending guide conveyer 41 for feeding the fastener elements toward the notches 23 in the rings 7 while the latter are advancing the stringer. As shown

(Figs. 5, 6 and 7), the guide conveyer is in the form of a tube of rectangular cross-section, the long dimension of the rectangle being approximately the over-all width of the spread apart legs of the fastener elements, and the short dimension the thickness of those legs. At one side the wall of the tube is provided with a longitudinally extending slot 43 opening into its interior, into which slot extend the projections 37 of the fastener elements within the tube, as shown in Fig. 6.

The fastener elements F in a well known way may be fed from a hopper, or from a tool or machine which stamps out the elements, to the upper end of the tubular guide conveyer 41 with the open sides of the legs downward, so that they will gravitate downward in a row toward the lower end of the conveyer. Above the notched rings 7 is shown a wheel 45 having thin teeth 47, the teeth being adapted to enter the slot 43 in the conveyer and engage with the upper ends of the adjacent fastener element so as to push those below the wheel forcibly toward the notched rings 7 and cause them to enter the notches 23 as the latter successively come into alignment with the vertical row of fastener elements.

The wheel 45, as shown, is mounted on a spindle 49 rotatably carried in a bracket 51 (Fig. 1) mounted on the guide conveyer 41. This spindle may be driven in any suitable way as, for example, by either of the belt pulleys 53 fixedly carried on the ends of the spindle.

The wheel 45 preferably is driven by friction from the spindle 49. As illustrated (Figs. 6 and 7), for this purpose the spindle carries a fixed collar 55 at one side of the wheel and a fixed collar 57 at the opposite side, there being interposed between the collars and the wheel friction plates 59. Conveniently the collar 57 may be recessed as shown at 61, and in this recess may be placed a coiled compression spring 63 which bears against the adjacent friction plate 59, the spring being under such tension as to afford the desired degree of friction between the plates and the wheel. Preferably the wheel is rapidly driven, and theoretically at least remains stationary as the end of the fastener element slides over the space between the notches 23 in the rings 7, although the degree of rotation employed, being such as to feed approximately 1500 fasteners per minute if desired, is such that the wheel practically continuously rotates.

When the fastener element is pushed into the notch 23, as shown in Fig. 9, the ends of the jaws strike the bead 29 of the stringer, and the rotating wheel 45 causes the fastener element to be forced over the bead into the position shown by Fig. 10, the upper end 65 of the fastener element projecting more or less above the outer surfaces of the rings 7. Adjacent the guide member 41 is placed a stationary block 67 (Figs. 2 and 5) the lower curved surface 69 of which the projecting upper ends 65 of the fastener elements are adapted to contact. This surface at its right hand end as viewed in Fig. 5 is spaced from the outer surfaces of the rings 7, and is inclined toward those surfaces as it progresses toward the left so as gradually to push the fastener elements into the notches 23 and bring their ends 65 into flush relation with the outer surfaces of the rings. By this tapered construction of the surface 69 shock is avoided when the fastener elements strike that surface, and the elements will be gradually pushed over the bead 29 as they move from the position of parts shown in Fig. 10 toward that shown in Fig. 11, and will be held in the latter position while the jaws of the elements are being closed on the stringer. The grooves 25 which receive the edge bead of the stringer act to hold the bead in proper position while the fastener elements are being pushed over the bead by the wheel 45 and the surface 69, and while the jaws are being closed. Preferably the surface 69 is so shaped as to bring the outer ends of the fastener elements in flush relation with the outer surfaces of the rings 7 prior to the jaws being materially closed on the stringer. As will be clear from Figs. 8 to 11, the depths of the notches 23 which receive the jaws 33 of the fastener elements are such as properly to close the jaws upon the stringers by the time the parts are in the position shown by Fig. 11. This closing operation is gradual, and thus permits the device to be operated at high speed. Further, the jaw closing pressure is applied for a considerable period as practically the notches on the rings 7 are at their point of minimum separation through a considerable arc.

It will also be observed from Fig. 8 that when the notches 23 are at their point of minimum separation, and while they are approaching that point, the fastener elements are closely confined by the walls of the notches, with the result that the fastener elements will be uniformly spaced along the stringer. This result is secured by feeding the fastener elements into the notches when the latter are spread apart sufficiently to receive the jaws but not the projections 37 of the elements, as will be clear from Fig. 8. Then as the notches come together and out of angular disalignment the projections 37 enter the notches. If the projections entered the notches at the same time as the jaws with the notches in angular disalignment the fastener elements would be loosely held in the notches when the latter are moved out of such disalignment, and as a consequence uniform spacing of the elements along the stringer would not be secured.

It will be further understood that the gradual application of the closing forces to the jaws of the fastener members could not be secured with notches on the periphery of wheels in the same plane unless the wheels were of such enormously large diameter as would render them impractical for use, but that this result can be readily obtained with a machine constructed according to the present invention with relatively small wheels, wheels about 8 inches in diameter in a machine according to the invention being capable of applying fasteners at the rate of approximately 1500 per minute.

It will be understood that, within the scope of the appended claims, wide deviations may be made from the forms of the invention described without departing from the spirit of the invention.

I claim:

1. A machine for assembling separable fastener elements with a stringer having, in combination, a pair of facing rotary parts the axes of rotation of which are at a relatively wide angle to each other, means for rotating said parts at the same speed in the same direction whereby points on a moving portion of one gradually approach and recede from corresponding facing points on the other along paths at a relatively narrow angle to each other, said parts having complementary facing arcuate series of spaced notches coaxial with their axes of rotation, means for guiding a length of stringer between said two series of notches along portions of the arcs of said series

adjacent their point of minimum separation, means for successively placing fastener elements in said notches at a point where said series are spaced apart sufficiently to cause one edge portion of the fastener element to be received in a notch of one series and its opposite edge in an opposite notch of the other series, which point is at a position where said opposite notches in which the fastener element is so placed are spaced apart more than the minimum spacing between said series, whereby continued rotation of said notches from said point toward the point of minimum separation of said series will cause the bottom walls thereof to move toward each other and operate on the fasteners gradually to deform them into secured relation with the stringer.

2. A machine according to claim 1 in which the means for placing the fastener elements in the notches is adapted to place fastener elements having open jaws over the edge portion of a stringer with the jaws straddling said portion, the said walls of the notches which operate upon the fastener elements being adapted to close said jaws whereby to clamp the fastener elements to the stringer.

3. A machine according to claim 1 in which each series of notches is formed with means operatively providing a groove for receiving an edge bead on the stringer, the means for placing the fastener elements in the notches being adapted to place fastener elements having open jaws on the stringer with the jaws straddling the bead, the said walls of the notches which operate upon the fastener elements being adapted to close said jaws whereby to clamp the fastener elements to the stringer.

4. A machine for assembling separable fastener elements with a stringer provided with an edge bead having, in combination, means for placing fastener elements having open jaws over the edge portion of a stringer having such bead with the jaws straddling said head, a pair of rotary parts, means for passing the stringer and fastener elements between said rotary parts for causing the latter to operate upon said jaws for closing them upon the stringer, means operating to press the fastener elements toward the stringer after said jaws are placed in such straddling relation therewith, and means for engaging the bead of the stringer for holding the latter against transverse movement relative to said rotary parts while the fastener elements are being so pressed.

5. A machine according to claim 4 in which the means for holding the stringer against transverse movement comprises a groove on one of said rotary parts for receiving the edge bead of the stringer, and the means for pressing the fastener elements toward the stringer comprises a part providing an inclined stationary surface spaced from said groove, with which surface the portions of the fastener elements opposite the jaws thereof are adapted slidingly to contact.

6. A machine for assembling separable fastener elements with a stringer provided with an edge bead having, in combination, means for placing fastener elements having open jaws over the edge portion of a stringer having such bead with the jaws straddling said bead, a pair of rotary parts presenting facing portions, means for passing the stringer and fastener elements between said facing portions of said rotary parts for causing said facing portions to operate on said jaws for closing them on the stringer, the axes of rotation of said rotary parts being at an angle to each other close to 180 degrees whereby said facing portions of said parts are at a relatively narrow angle to each other, each rotary part operatively having a groove for receiving a side portion of said bead, and means for pressing the fastener elements toward said edge portion of said stringer after said elements are placed in straddling relation with said bead.

7. A machine according to claim 6 in which the means for pressing the fastener elements toward the beaded edge portion of the stringer comprises means providing a surface spaced from such edge, with which surface the portions of said elements opposite the jaws thereof are adapted slidingly to contact.

8. A machine for assembling separable fastener elements with a stringer having, in combination, a pair of rotary parts the axes of rotation of which are at a relatively wide angle to each other, which parts longitudinally of their axes face each other, each of said parts being formed with a series of notches coaxial with its axis of rotation, the series on one part facing those on the other, the spaces between said notches of each series being slotted jointly to present an interrupted groove adapted to receive one side of an edge bead of a stringer between said series; means for placing fastener elements having spread jaws in said notches with one jaw in one notch of a pair of opposite notches and the other jaw in the opposite notch of such pair and with the jaws straddling the stringer, said means operating to so place said elements in said notches at such rotative positions of the latter that further rotation of said notches will close said jaws on said stringer; and means providing a stationary inclined surface, with which surface the portions of said elements opposite the jaws thereof are adapted slidingly to contact after the elements are placed in said notches, said surface being so spaced from said notches as to cause the elements to be pressed toward said bead.

9. A machine for applying to a stringer separable fastener elements having open jaws extending from a head provided with a lateral projection transverse to the plane of said jaws having, in combination, a pair of spaced facing rotary parts the axes of rotation of which are at a relatively wide angle to each other, said parts having means forming a pair of facing arcuate series of uniformly spaced notches coaxial with their axes of rotation, the widths of which notches lengthwise of said series are substantially equal to the thicknesses of the fastener elements at the projections thereof, the notches of one series opening toward those of the other, each series being of the same radius, and the two series being in proximity with each other at their point of minimum separation; means for rotating said parts at the same speed in the same direction so that notches on one series of notches gradually approach and recede from corresponding facing notches on the other along paths at a relatively narrow angle to each other; means for guiding a length of stringer between said series along portions of their arcs adjacent their point of minimum separation; means for successively placing fastener elements in said notches with the jaws of said elements in straddling relation to an edge of the stringer so guided at a point where said series are spaced apart sufficiently to cause one jaw of the fastener element to be received in a notch of one series and the other jaw thereof in an opposite notch of the other series with the projection of the fastener element lying between

such notches, which point is at a position where the bottoms of said opposite notches in which the fastener element is so placed are spaced apart more than at the point of minimum separation between said series and more than the maximum width of the fastener element at the open jaws thereof whereby by continued rotation of said notches from said position toward the point of minimum separation of the series will cause said notches in which the fastener element is placed to move toward each other and receive the projection of the fastener element, and, after said projection is so received, will cause the bottom walls of said notches to engage with the open jaws of the element and gradually close them into clamping engagement with the stringer.

10. A machine according to claim 9 in which the means providing the two series of notches is so formed as to provide a slot in the space between each adjacent pair of notches of each series, which slot connects said notches so that the slots of each series jointly present an interrupted arcuate groove for receiving one side of an edge bead of the stringer guided between the two series adjacent their point of minimum separation, over which bead the fastener elements are placed with their jaws straddling said bead.

11. A machine according to claim 9 in which the means providing the two series of notches is so formed as to provide a slot in the space between each adjacent pair of notches of each series, which slot connects said notches so that the slots of each series jointly present an interrupted arcuate groove for receiving one side of an edge bead of the stringer guided between the two series adjacent their point of minimum separation, over which bead the fastener elements are placed with their jaws straddling said bead, the machine further having means for engaging the ends of the moving fastener elements opposite the jaws thereof for pressing said elements toward said grooves after they are so placed on the stringer.

12. A machine for applying fastener elements to a stringer having, in combination, a pair of adjacent facing parts rotatable about axes at a relatively wide angle to each other, said parts operatively providing a pair of facing closely adjacent arcuate series of uniformly spaced notches and an associated pair of closely adjacent facing grooves, which series and grooves are coaxial with the axes of rotation of said parts; means for rotating said parts at the same speed in the same direction, whereby opposite notches of the two series and opposite points on said two grooves will move into proximity at the point of minimum separation of said series and grooves and then separate along paths at a relatively narrow angle to each other; means for guiding a length of stringer heaving a longitudinally extending bead between said grooves at a position where the latter are sufficiently separated to permit the bead to be received between them, whereby rotative movement of opposite points on said grooves from said position toward the point of minimum separation of said grooves will close the latter on said bead and thus cause a portion of the length of the stringer to follow portions of the arcs of said series of notches; and means for successively placing fastener elements having open jaws on an edge of the stringer, with the jaws straddling said edge and with one jaw of each element received in a notch of one of said series and the other jaw thereof in an opposite notch of the other series, at a position where said opposite notches are spaced apart sufficiently to so receive said jaws, whereby rotation of said opposite notches from the last mentioned position toward the point of minimum separation of said series will cause the bottom walls of said notches to operate on said jaws to close them on the stringer.

13. A machine for applying fastener elements to a stringer having, in combination, a pair of adjacent facing parts rotatable about axes at a relatively wide angle to each other, said parts operatively providing a pair of facing closely adjacent arcuate series of uniformly spaced notches coaxial with the axes of rotation of said parts with a slot connecting each of adjacent notches of each series so that said slots jointly form a pair of facing interrupted arcuate grooves; means for rotating said parts at the same speed in the same direction, whereby opposite notches of the two series and opposite points on said two grooves will move into proximity at the point of minimum separation of said series and grooves and then separate along paths at a relatively narrow angle to each other; means for guiding a length of stringer having an edge bead between said series of notches at a position where said grooves are sufficiently separated to permit the bead to be received between them, whereby rotative movement of opposite points on said grooves from said position toward the point of minimum separation of said grooves will close the latter on said bead and thus cause a portion of the length of the stringer to follow portions of the arcs of said series of notches; and means for successively placing fastener elements having open jaws on the beaded edge of the stringer so guided, with the jaws straddling said bead and with one jaw of each element received in a notch of one of said series and the other jaw thereof in an opposite notch of the other series, at a position where said opposite notches are spaced apart sufficiently to so receive said jaws, whereby rotation of said opposite notches from said last mentioned position toward the point of minimum separation of said series will cause the bottom walls of said notches to operate on said jaws to close them on the stringer.

MARTIN WINTERHALTER.

CERTIFICATE OF CORRECTION.

Patent No. 2,335,034. November 23, 1943.

MARTIN WINTERHALTER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 43, claim 4, for "head" read --bead--; page 4, first column, line 59, claim 12, for "heaving" read --having--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of February, A. D. 1944.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)