

March 6, 1962

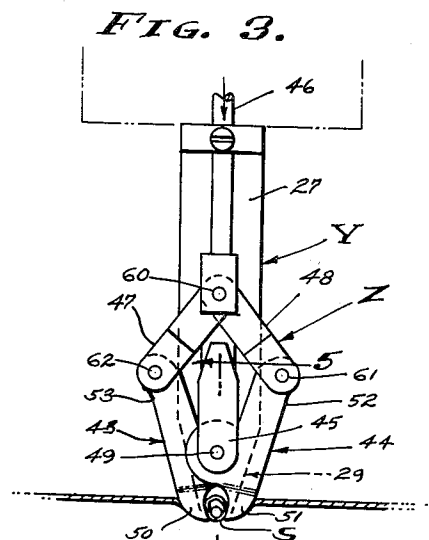
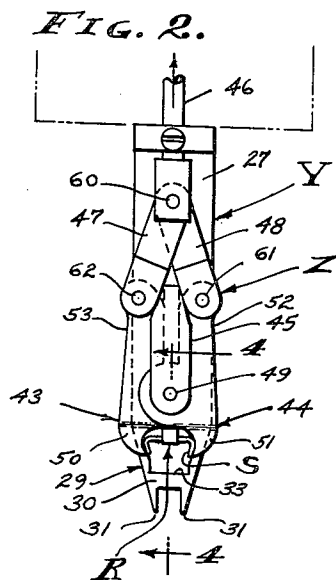
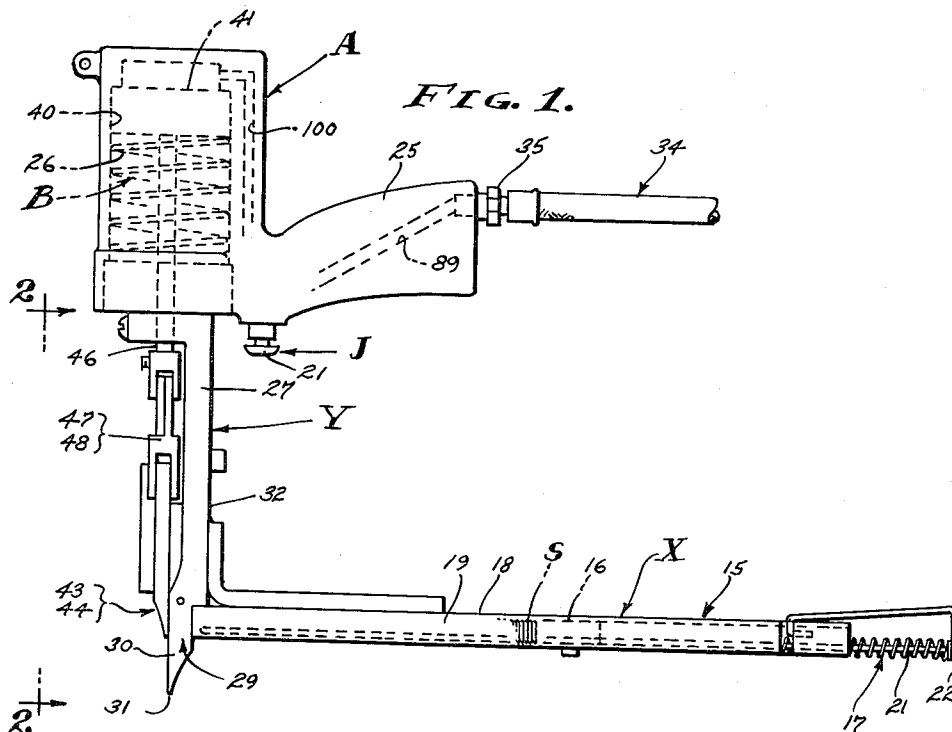
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3,023,417

HOG-RING APPLICATING TOOL

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2 Sheets-Sheet 1



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HOG-RING APPLICATING TOOL

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FIG. 4.

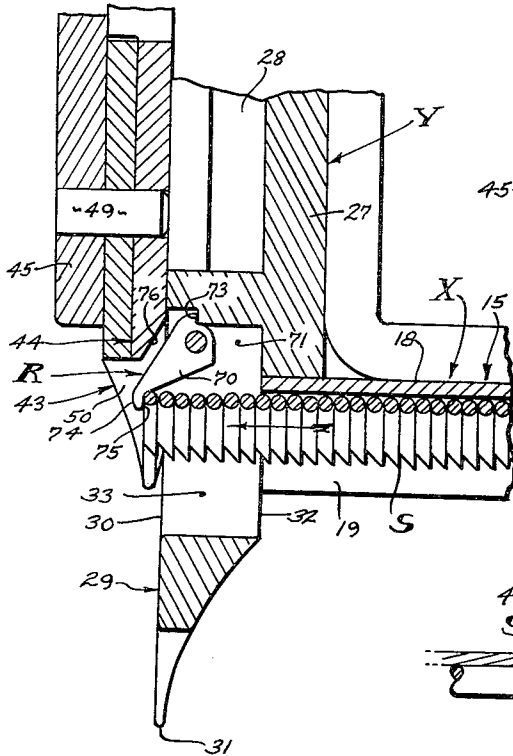


FIG. 5.

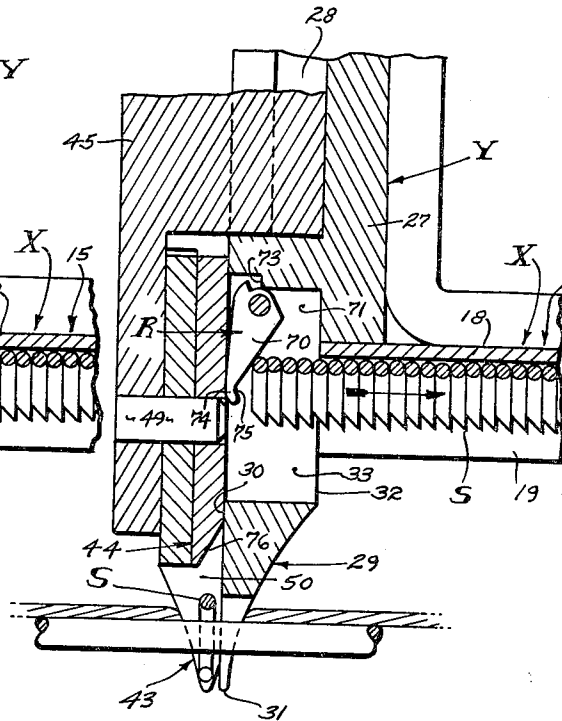


FIG. 6.

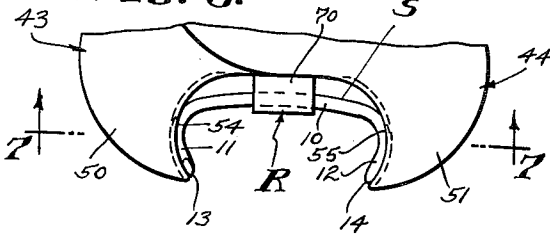


Fig. 7.

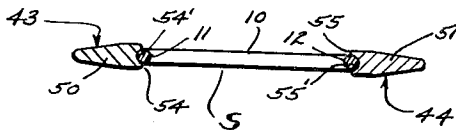
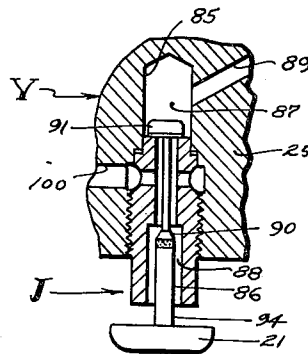


FIG. 8.



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3,023,417

HOG-RING APPLICATING TOOL

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4 Claims. (Cl. 1—187)

This invention relates to hog-ring applying tools and the like and is particularly concerned with a power actuated tool that clinches hog-rings and applies them in working position through the co-action of a pair of shiftable clinching jaw members.

Hog-rings are specialized fasteners and can be employed, for example, to fasten sheet material to structural elements. For example, burlap coverings are fastened to springs and frames by the use of hog-rings that are clinched through the burlap and onto or over the spring or frame elements, as the case may be. In practice, the hog-rings are U-shaped in configuration and are supplied in a stack composed of a multiplicity of said fasteners. The usual tool for the handling and clinching of hog-rings involves a slide that shiftable carries a pair of clinching jaw members and said jaw members are characterized by recesses at their inner surfaces to receive the end portions of an open U-shaped hog-ring prior to the clinching of the same.

The present invention has to do with the elimination of said usual recesses in the inner surfaces of the jaw members, in order to reduce the thickness and bulk of said jaws, whereby the hog-rings as applied by the tool have improved penetrating capability. In other words, the common construction of said jaw members, with recesses therein, is cumbersome, said usual jaw members being at least twice the thickness of the hog-ring thickness, or diameter. It will be readily apparent that the thickness of said jaw members interferes materially with the adaptability of the tool and is damaging to fabrics, and with the result that the usual tool has limited application.

It is a general object of this invention to provide a hog-ring applying tool involving clinching jaw members wherein new and improved means is provided to position the hog-rings, one at a time, to be operated upon and clinched by said members when the tool is operated.

An object of this invention is to provide a tool of the character referred to that restrains movement of the stick or supply of hog-rings independently of the clinching jaw members and which positions one ring at a time in place to be operated upon by said members. With the means provided by the present invention only a single staple or U-shaped fastener, or hog-ring, is released to be operated upon by the jaws and the common malfunction of more than one staple being allowed to enter between the jaws is virtually eliminated.

It is an object of this invention to provide a tool of the character referred to wherein the jaws are much less cumbersome and wherein the opening between the jaws is unobstructed. By providing separate independently operating means that supports and positions the stick or supply of fasteners the configuration of the jaws can be reduced and the usual recess and lip completely eliminated if desired, said recess and lip being common to the ordinary tools of this type, and whereby the said jaws are made substantially slender and with increased opening therebetween. Said slendered jaws result in a tool that has greater adaptability since there is substantially less interference with the objects and parts being fastened.

Another object of this invention is to provide a tool of the character referred to wherein the clinching jaws are of reduced configuration to the end that complete 100% clinching of each hog-ring type fastener is realized. Here-

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tofore, the more cumbersome jaws of the prior art tools prevent complete closing around many objects, for example, when the lips of the opposed jaws engage said objects before the hog-ring is closed. With the structure of the present invention, that is, a separate positioning means for the stick or supply of hog-rings, there is no limiting of the closing operation of the jaws since there is no lip to be interfered with.

It is still another object of this invention to provide a tool of the type under consideration wherein jams of the stick or supply of fasteners is eliminated, the retaining means provided in accordance with the invention acting to shift or reciprocate said stick or supply to the end that sticking and jamming is virtually eliminated.

The various objects and features of this invention will be fully understood from the following detailed description of the typical preferred form and application thereof, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a side view of a typical hog-ring applying tool and shows the general relationship of elements thereof. FIG. 2 is a front elevation of a portion of the tool shown in FIG. 1 and taken as indicated by line 2—2 on FIG. 1 and illustrates the mechanism in a normal unactuated position. FIG. 3 is a view similar to FIG. 2 showing the mechanism in the actuated position. FIGS. 4 and 5 are enlarged detailed sectional views taken as indicated by lines 4—4 and 5—5 of FIGS. 2 and 3, respectively. FIG. 6 is an enlarged detailed view of a portion of the tool showing the jaw members thereof engaged with a hog-ring. FIG. 7 is a sectional view taken as indicated by line 7—7 on FIG. 6, and FIG. 8 is a detailed section showing the valve provided for operating the tool.

Tools for applying hog-rings and the like are adapted to receive and process U-shaped fastener elements that are closed into ring-shaped elements by a clinching process performed by said tools. In order to expedite processing of the fastener elements a magazine is cooperatively related to the fastener processing parts of the tool so that individual fastener elements are automatically and consecutively fed into processing position. The particular tool under consideration is a powered tool that is actuated by fluid pressure and it has a magazine X fixedly related to a frame Y and adapted to deliver hog-rings S to a processing mechanism Z. In the tool shown throughout the drawings a portion of the frame Y is formed so as to be inserted through a panel of material and said frame guides the mechanism Z so that the hog-rings S are clinched and secured to said panel of material and over objects suitably related thereto (as shown in FIGS. 3 and 5).

The hog-ring type fasteners S that are adapted to be handled by the tool under consideration are provided in stacked relationship. That is, a stick of U-shaped fasteners S is provided in which the individual fastener elements are secured one to the other by suitable means, for example, by means of an adhesive applied to or over the plurality of elements. The particular fasteners illustrated are designed specifically to form hog-rings and involve an elongate spreader portion 10, and inwardly turned end portions 11 and 12 and said portions of the fastener are integrally formed of suitable wire, preferably round wire, joined by bent portions.

The magazine X is provided to carry a supply of fasteners S in the form of a stick and deliver them toward the frame Y of the tool to be operated upon by the mechanism Z. The magazine involves, generally, a body 15, a follower 16, and means 17 urging the follower forwardly in the body 15. The body 15 is elongate and is open along one side and at its ends, and is formed to the configuration of the fasteners S and has a back 18 to guide the portions 10 of the fasteners and has inwardly

turned angularly related sides 19 to guide the end portions 11 and 12 of the fasteners. The axis of the body 15 is normally related to the axis of the frame Y later described and the open delivery end of the body 15 is supported by the said frame. The follower 16 slides in the body to be yieldingly urged against the outer end of the stack of fasteners S to move them toward the frame Y. The means 17 involves a spring 21 releasably anchored by a rod 22 to press against the follower 16.

The tool, as illustrated in the drawings, is adapted to be handled manually and involves, generally, the frame Y having a handle or grip portion 25 and adapted to support and carry the cooperatively related elements of the tool. That is, the frame Y carries the magazine X and the mechanism Z that receives the hog-rings S to process them, and it also carries a drive means A for operating the mechanism Z. A manually operable valve means J is provided to control the supply of fluid under pressure to actuate the drive means A through a work stroke, there being a return means B in the form of a compression spring 26 that retracts the mechanism Z after each operation of the tool.

The frame Y that carries the various elements of the tool is shaped to be conveniently handled by a person and involves, generally, an elongate body 27 with a guide 28 and with a head portion 29. The guide 28 is provided to direct movement of a slide of the mechanism Z later described and the head 29 is provided to direct the hog-rings S into position for clinching by the mechanism Z. Further, the head portion 29 is characterized by a flat front face 30 disposed in a plane extending longitudinally of the body 27, said face 30 extending to the terminal end of the head portion where the body is formed to have a pair of laterally spaced points or projections 31. The said points 31 are adapted to be projected into material in order to make way for the entry of a hog-ring there-through. As shown in FIGS. 1, 4 and 5, the magazine X projects laterally from the back side 32 of the head portion 29, and as shown in FIG. 2 an opening 33 extends through the said head portion between the back and front thereof, said opening 33 being aligned with the body 15 of the magazine X and shaped to form a continuation thereof. Thus, it will be apparent that hog-rings S, or like fasteners are delivered by the magazine X to pass through the opening 33 and to be positioned at the front face 30 where the mechanism Z operates to process the hog-rings S.

The handle or grip portion 25 is provided to give the person handling the tool a convenient means to hold the tool and is a simple grip of ordinary construction that projects from the body 27 in a direction substantially normal to the axis of the frame Y as shown in FIG. 1.

In structures of the type under consideration it is common to provide a fluid pressure supply connection 34 at the grip portion 25, such as a pneumatic means at the grip 25. It is to be understood that any suitable fluid pressure supply can be provided without affecting the present invention. In the case illustrated the hose of the power connection 34 is attached to the grip portion 25 through a quick disconnect 35 and the valve means J is under control of a finger operated trigger.

The drive means A is preferably a cylinder and piston type means and involves a cylinder 40 extending from the end of the body 27 opposite the head portion 29 thereof, the axis of the cylinder 40 being parallel with the longitudinal extent of the frame Y. A piston 41 operates in the cylinder 40 and the return means B involves the spring 26 that yieldingly urges the piston to the end of the cylinder away from the frame Y. A passage 100 enters the cylinder and is in communication with the valve means J to cause the piston 41 to compress the spring 26 and operate toward the frame Y when fluid under pressure enters into the cylinder under control of said valve means.

The valve means J is a fluid pressure supply and ex-

haust means that admits and exhausts operating fluid to and from the cylinder 40 through the passage 100. The means J is preferably formed in and carried by the frame Y of the tool, and, as shown, is housed in the grip portion 25. In the case illustrated, the valve means J involves a valve chest 85 formed or machined in the grip portion 25 and a slide 86 that is shiftably carried in the chest to control the flow of fluid. As shown, the chest 85 extends into the grip portion 25, there being a recess 87 within the chest and a recess 88 at the front of the chest. The recesses 87 and 88 are in the form of counter-bores, the recess 87 handling inlet of fluid under pressure and the recess 88 handling the exhaust of fluid. A pressure supply passage 39 connects the recess 87 to the quick disconnect 35—while the recess 88 simply opens to the outside atmosphere at the exterior of the grip portion 25.

The slide 86 of the valve means J is freely shiftable in the chest 85 and involves a plunger 90 that is operable in the recess 88 and a valve disc 91 that is operable in the recess 87. An extension 94 projects from the plunger 90 and is engaged by and operated by the trigger 21. When the valve means J is depressed by the trigger 21 the disc 91 is lifted from the seat allowing passage of fluid under pressure to the passage 100 that is in communication with the cylinder 40, while the plunger 90 enters the chest 85 to close the exhaust recess 88. When the valve means J is released to the position shown in FIGS. 1 and 8 the disc 91 is seated to close the recess 87 while the plunger 90 opens the recess 88 to exhaust fluid from the cylinder 40.

The mechanism Z is an advancing mechanism provided to process the hog-rings S that are delivered by the magazine X and is generally of the type disclosed in the A. C. Lind et al. Patent No. 2,605,467, issued August 5, 1952. However, in accordance with the present invention the lips and recesses in the clinching jaw members are eliminated, the hog-rings S being positioned by retaining means R hereinafter described. As is shown, the mechanism Z involves, generally, a pair of clinching jaw members 43 and 44 that are pivotally related to each other and shiftably carried by a slide 45. The said jaw members are shifted and then pivoted relative to each other by the movement of piston 41 that operates the mechanism Z through a piston rod 46 coupled to the jaw members 43 and 44 through a pair of links 47 and 48. The guide 28 of the frame Y directs movement of the slide 45 so that it is shiftably longitudinally of said frame at or overlying the front face 30 thereof. The slide 45 carries a pivot 49 disposed on an axis normal to the plane of the face 30 and placed to be centrally aligned with the magazine X and with the opening 33 through the head portion 29. The said pivot 49 rotatably carries and mounts the two jaw members 43 and 44, whereby said members can shift longitudinally of the frame and also pivot relative to each other.

The jaw members 43 and 44 are like complementary or opposite parts with forwardly extending arms 50 and 51 to engage the hog-rings S and with rearwardly extending legs 52 and 53 to be coupled with the piston rod 46 through the respective links 48 and 47. The members 43 and 44 overlie, or slidably engage with, the front face 30 with the arms and legs thereof projecting radially from the pivot 49. When the said members 43 and 44 are in a normally retracted and unactuated position, as shown in FIGS. 2 and 4, the arms are moved apart and are in opposed relationship, and the legs are moved together and spaced circumferentially relative to the axis of the pivot 49. As shown in FIGS. 2 or 3, the jaw members 43 and 44 are crossed to have a scissor action whereby the arms come together as the legs move apart.

In accordance with the invention, the arms 50 and 51 have curved inwardly faced sides 54 and 55, respectively, located to just pass the width or end portions 11 and 12 of the hog-rings S. Further, the curvature of

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the sides 54 and 55 follows the curvature of the end portions 11 and 12 respectively, as the sides extend inwardly from the terminal ends of the arms, and as the sides progress further inwardly the curvature thereof increasingly clears the spreader portion 10 of the hog-ring, which in practice gives the desired formation to the hog-ring when it is clinched. As is clearly shown in FIG. 7 of the drawings, the sides 54 and 55 are of a width or thickness corresponding generally to the width or thickness of the individual hog-rings S. That is, the sides 54 and 55 are about as wide as the diameter of the hog-ring body, said sides being characterized by a grooved or channel-shaped configuration. More specifically, each side 54 and 55 is concaved at 54' and 55' to form a groove or channel that guides and positions the hog-rings in the jaw members 43 and 44 when said members are operated to shift and clinch said hog-rings. Thus, it will be apparent that there are no projections to extend inwardly of the hog-rings when they are in the process of being clinched.

The coupling links 47 and 48 are alike and are driven by the piston rod 46 through a common drive pin 60. The two links 47 and 48 are circumferentially spaced, as related to the axis of the pin 60, and each is pivotally engaged with the end of a leg, link 47 with leg 53, and link 48 with leg 52. Pivots 61 and 62 are provided to couple the links and legs, normally placed outward of alignment with the pivot 49, to the end that a toggle action takes place resulting in outward movement of the legs and inward movement of the arms when the piston rod 46 moves relative to the slide 45. When the tool is operated, as shown in FIGS. 3 and 5, the slide 45 is shifted forward and is stopped by an abutment on the frame Y, there being a hog-ring S carried between the jaw members 43 and 44, said hog-ring S being sheared off of the stick or supply thereof. When the slide 45 is stopped the hog-ring S is positioned at or adjacent the tips or points 31 and is there clinched as indicated by the above set forth action of the links that rotate the jaw members 43 and 44.

From the foregoing it will be apparent that the present invention utilizes a tool that resembles prior constructions with the exception that there is no provision therein for positioning or placing the fasteners or hog-rings at or between the arms 50 and 51 of the jaw members 43 and 44. However, this invention provides separate and independently operating means referred to as retaining means R that functions in several capacities to shift or reciprocate and position the stick or supply of hog-rings S as supplied by the magazine X. The said retaining means R is visible in FIG. 2 of the drawings and is best illustrated in FIGS. 4 and 5, and involves a shiftable stop 70. The said stick of hog-rings S is yieldingly urged to issue through the passage 33 and at the front face 30 and the stop 70 is carried by the frame Y to normally engage and position the forwardmost hog-ring S. That is, the stop 70 is engageable with said forwardmost hog-ring when the mechanism Z is in a normally retracted unactuated position. In accordance with the invention, the stop 70 is shiftable to a position between the arms 50 and 51 where it retains the forwardmost hog-ring S in alignment with the grooves or channels at 54' and 55'. Since the slide 45 and jaw members 43 and 44 carried thereby are advanced to shear the hog-ring from the stick or supply thereof, the stop 70 is made retractable to a position below the plane of the front face 30. Therefore, the stop 70 is shiftable carried by the frame Y to move from said extended position positioning the forwardmost hog-ring S as above described and to a retracted position below the plane of the front face 30.

In the preferred form of the invention, the stop 70 is centrally accommodated in a recess 71 opening at the front face 30 and into the passage 33. The stop 70 is a pivoted member carried on a pin 72 extending transversely of the frame Y below the face 30 and allowing

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the stop to swing freely between the positions above referred to, as shown in FIGS. 4 and 5, there being a step 73 in the recess 70 and which engages a part of the stop 70 to limit forward movement thereof. The stop 70 is characterized by a shoulder 75 that engages the central portion of the spreader portion 10 of the forwardmost hog-ring S, said shoulder 75 being in a plane spaced from and parallel to and opposing the plane of the face 30 when the stop is extended (see FIG. 4). In accordance with the invention, the forwardmost hog-ring S in the process of being sheared from the stick or supply thereof is gripped by the arms 50 and 51 and moved forwardly out of engagement with the stop 70 whereupon the said stop is engageable with the next succeeding hog-ring S. However, before the next succeeding hog-ring S is released by removal of the preceding hog-ring S, the stop 70 is depressed and shifted below the plane of the front face 30 through cooperative engagement with a part or parts of the mechanism Z that shift forwardly.

In practice, the stop 70 has a rounded top 74 that is engaged by one of the jaw members 43 or 44, the said engaging jaw member having a cam face 76 that acts to wedge the stop 70 downwardly so that it swings to the position shown in FIG. 5. In the process of swinging to the latter position the stop 70 engages the next succeeding hog-ring S and depressed it and the entire stick behind it, and thereby shifts or reciprocates the stick or supply of hog-rings S.

With the improved tool herein disclosed each of the objectives enumerated at the outset of this specification is accomplished. Mainly, but one fastener is delivered at a time and the clinching jaw members 43 and 44 are of minimum size and configuration. As a result, the hog-rings S can be applied with minimized damaging effect, and without interference with wires or rods around which the hog-rings are commonly clinched. Furthermore, jams of the hog-rings S in the magazine X are virtually eliminated due to the shifting movement and the resultant reciprocation of the stick or supply thereof during each and every operation of the tool.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A fastener applicator tool having a frame with an opening therethrough for passing a stick of fasteners with a forwardmost fastener positioned for engagement by a mechanism of the tool that advances the said forwardmost fastener into objects to be fastened, and including, a retaining means operating independently of the advancing mechanism of the tool and comprising a stop shiftable carried by the frame and engageable with the forwardmost fastener issued from the opening in the frame and depressible by engagement with a part of said advancing mechanism and whereby only said forwardmost fastener is positioned for engagement by said advancing mechanism and whereby said stop shifts toward said stick of fasteners upon engagement by said part of the advancing mechanism in order to reciprocate the said stick of fasteners by engaging and depressing the next succeeding forwardmost fastener.

2. A hog-ring applicator tool having a frame with an opening therethrough for passing a stick of hog-rings with a forwardmost hog-ring positioned for engagement by a pair of pivotally related clinching jaw members shiftable carried by a slide that advances so as to shift the forwardmost hog-ring into objects to be fastened, and including, a retaining means carried by the frame at said opening and operating independently of the said jaw members and comprising a stop shiftable relative to the frame and engageable with the forwardmost hog-ring issued from the opening in the frame, said stop being depressible by

engagement with the slide whereby said forwardmost hog-ring is engaged solely by and for processing by said shiftable clinching members.

3. A hog-ring applicating tool having a frame with an opening therethrough for passing a stick of hog-rings with a forwardmost hog-ring positioned for engagement by a pair of shiftable and pivotally related clinching jaw members of the tool that advances the said forwardmost hog-ring into objects to be fastened, and including, complementary and opposed sides on the jaw members respectively and each side being grooved to receive opposite sides of the forwardmost hog-ring, and a retaining means carried by the frame at said opening and operating independently of the said jaw members and comprising a shiftable stop to move relative to the frame and engageable with the forwardmost hog-ring issued from the opening in the frame, said stop being engaged and moved by said jaw members to shift toward said stick whereby said forwardmost hog-ring is engaged solely by and for processing by said shiftable clinching members.

4. A hog-ring applicating tool having a frame with an opening therethrough for passing a stick of hog-rings

with a forwardmost hog-ring positioned for engagement by a pair of shiftable and pivotally related clinching jaw members of the tool that advances the said forwardmost hog-ring into objects to be fastened, and including, complementary and opposed sides on the jaw members respectively and each side being substantially as thick as the thickness of the hog-ring and being grooved to receive opposite sides of the forwardmost hog-ring, and a retaining means carried by the frame at said opening and operating independently of the said jaw members and comprising a shiftable stop to move relative to the frame and engageable with the forwardmost hog-ring issued from the opening in the frame, said stop being engaged and moved by said jaw members to shift toward said stick whereby said forwardmost hog-ring is engaged solely by and for processing by said shiftable clinching members.

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