United States Patent [19]

Eppler

[11] **3,877,278**

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[54] **SELECTIVE DISPENSING MECHANISM**

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[52] **U.S. Cl.** **72/270;** 72/424

[51] **Int. Cl.** **B21c 33/00**

[58] **Field of Search** ..... 72/259, 424, 421, 270; 29/628, 630 A, 517, 520; 425/517

[56] **References Cited**

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Primary Examiner—Milton S. Mehr
Assistant Examiner—Robert M. Rogers
Attorney, Agent, or Firm—David Teschner; Jesse Woldman

[57] **ABSTRACT**

An improved extrusion tool comprises a selective dispensing mechanism having a pair of opposed arms each having a first end arranged to block a passageway from a respective connector receiving aperture to the nose portion orifice when in a first position, each arm being movable to a second position permitting access between a respective connector receiving aperture and the nose portion orifice upon engagement with a cam means cooperatively coupled to a plunger reciprocatingly movable in the extrusion tool housing. The cam means is movable to one of two positions for displacing a selective one of the arms to permit a connector seated within a respective connector receiving aperture to enter the passageway between the connector receiving aperture and the nose portion orifice and be positioned adjacent the latter upon the next stroke of the plunger. Each of the connector receiving apertures may be configured to receive similar or dissimilar parts which may be selectively dispensed into the extrusion area by predetermined manipulation of the cam means. The free end of the arms may be suitably shaped to at least partially embrace the preselected connector positioned within the extrusion zone.

13 Claims, 9 Drawing Figures

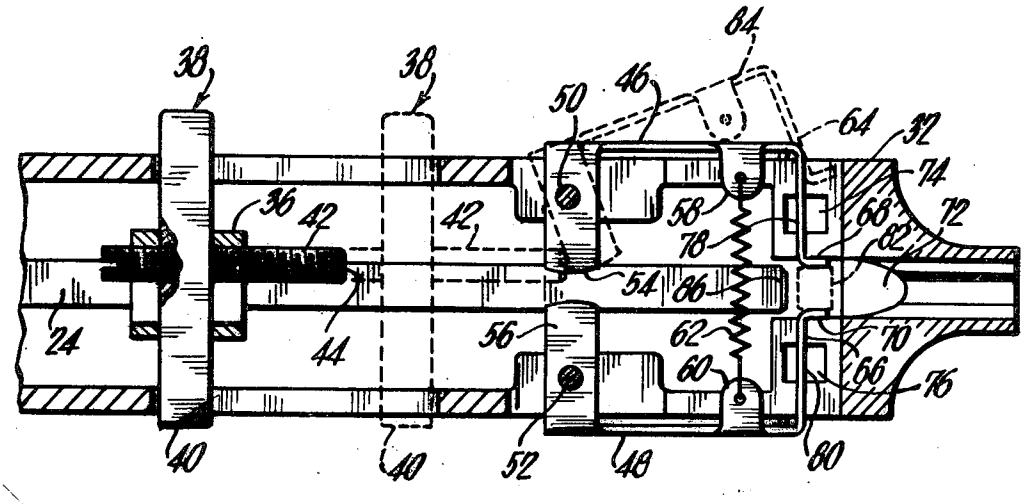


Fig. 1.

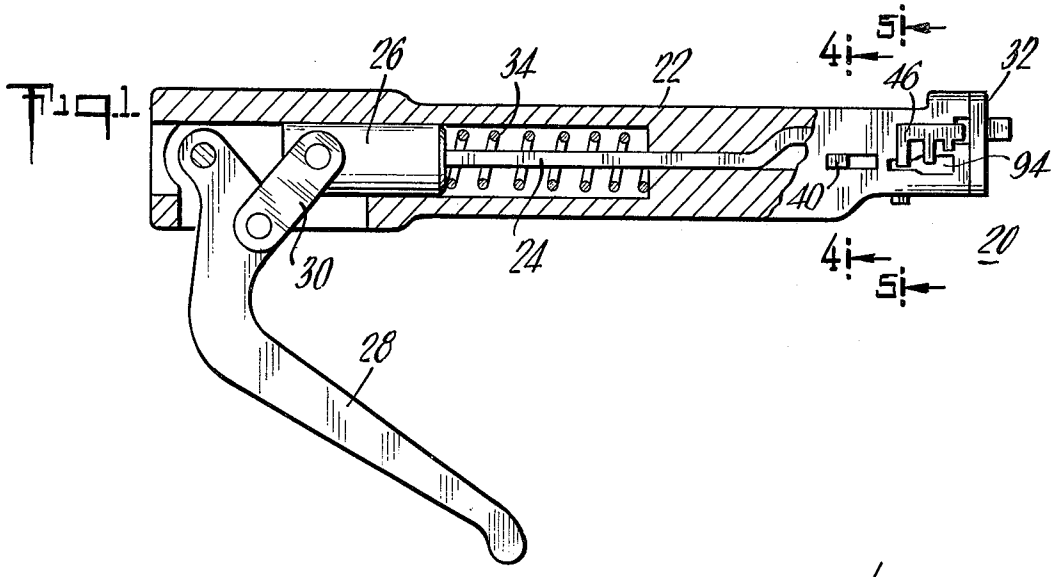


Fig. 2.

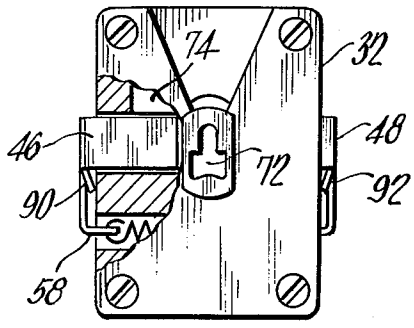


Fig. 4.

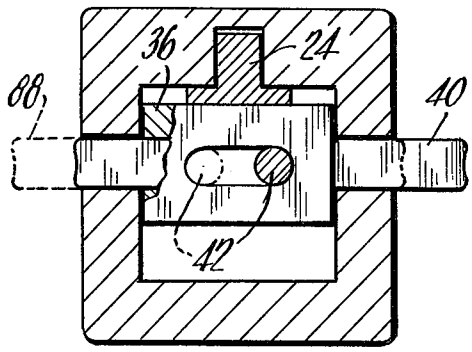


Fig. 3.

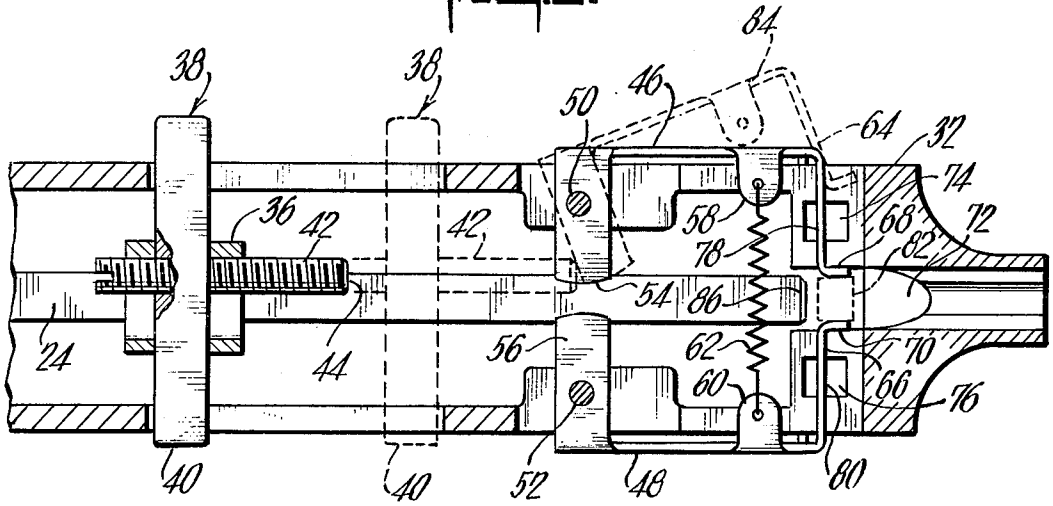


Fig. 5.

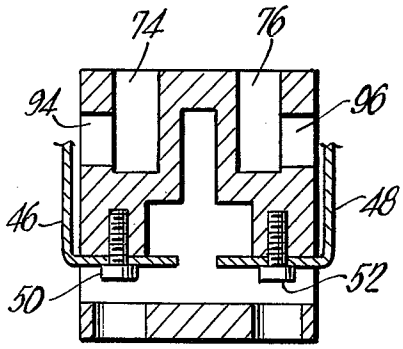


Fig. 6.

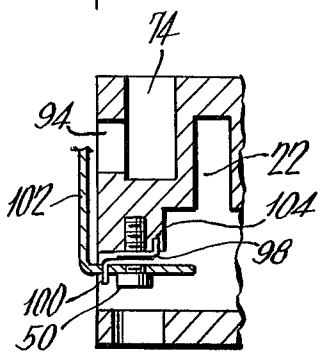


Fig. 7.

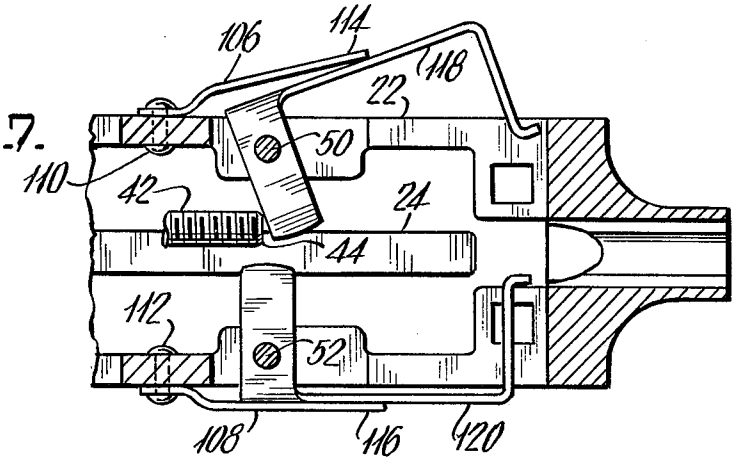
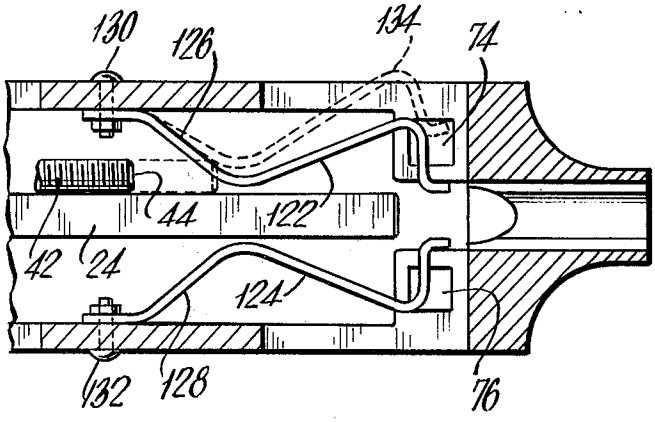


Fig. 8.



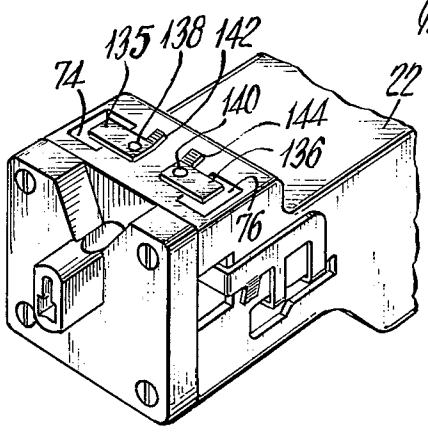


Fig. 9.

SELECTIVE DISPENSING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to the field of dispensing mechanisms and principally to a device for extrusion tools or the like.

2. Description of the Prior art

Prior art wire terminating devices may be divided into two general categories, namely, those devices designed to crimp a wire terminating device or connector to one or more conductors, and extrusion type apparatus in which the connector is forcibly advanced through a restrictive orifice to extrudably deform the connector about the conductor. Examples of the latter apparatus are disclosed in U.S. Pat. No. 3,614,885 issued Oct. 26, 1971 to Eppler and assigned to the assignee of the instant invention, and in U.S. Pat. No. 3,674,392 issued July 4, 1972 to Eppler and similarly assigned to the assignee of the instant invention. Both tools feature a housing having a single connector receiving orifice through which may be inserted a connector which is guided into a chamber located at the entrance to a restrictively orificed nose portion of the tool so that upon advancement of the extruding plunger, the connector is urged into and through the restrictive orifice and radially deformed inwardly about one or more conductors placed within the connector. The single feed arrangement disclosed in the above mentioned patents, although adequate in a given number of applications, may seriously limit the versatility and convenience of the tool by restricting its capacity for storage and use of, for example, connectors adapted for different conductor sizes since the user is required to manually select and feed one particular type of connector into the tool at any one time. Changeover in such a tool requires emptying the tool of the previously fed or stored connectors and replenishing with connectors suitable for subsequent terminations. Otherwise, the user is required to have available duplicate tools each loaded with a particular type of connector, an arrangement which is generally quite costly, cumbersome, and of limited utility in practice.

SUMMARY OF THE INVENTION

The invention overcomes the difficulties and limitations noted above with respect to prior art devices by providing a selective dispensing mechanism for an extrusion tool or the like to permit either similar or dissimilar parts to be loaded into the tool and selectively dispensed into the extrusion zone in a single, rapid, and simple operation to increase the speed, efficiency, utility, and versatility of such prior art tools. The selective dispensing mechanism comprises a pair of opposingly disposed arms pivotably coupled to the body portion of the tool and selectively operated by a cam means cooperatively coupled to the plunger so that as the plunger is advanced forwardly towards the connector extrusion chamber in the nose of the tool, a selective portion thereof is caused to engage either one or the other of the arms of the dispensing mechanism according to a preselected position of the cam, to pivot the selected arm from its first position to a second position to permit a connector seated within a respective one of a pair of connector receiving apertures adjacent the nose of the tool to be dispensed into a receiving chamber and urged towards the extrusion zone as the plunger returns

to its retracted position. The arms are normally biased towards one another in a first position and provide a blockage between a respective connector receiving aperture and the extrusion zone. Each arm may then be selectively cammed to a second or dispensing position to provide unrestricted access between the corresponding connector receiving aperture and the extrusion zone. The connector which has been directed into the receiving chamber is thereafter laterally displaced by the first end of a corresponding arm as the arm returns to its first position so that the connector is properly positioned in the extrusion zone for advancement through the nose portion of the tool upon reactivation of the plunger. The respective connector receiving apertures may be suitably proportioned to provide for the reception of either similar or dissimilar parts and may incorporate guides, ribs, or other elements therein for adapting the apertures for use with preselected connectors of varying configurations. The first and second arms may each comprise either a relatively rigid member having at one end thereof a finger portion formed out of the plane of the arm and disposed inwardly of the tool body and attached to a corresponding pivot member extending through an aperture in the finger portion so that each arm may pivot thereabout upon engagement by the cam means. Alternatively, each of the arms may be formed as a resilient spring member having a cam engaging surface arranged to be contacted by the cam means for selective movement between its first and its second position, each arm being independently biased towards its first position with its first end disposed generally adjacent the nose portion orifice. It is therefore an object of this invention to provide an improved tool having a selective dispensing mechanism.

It is another object of this invention to provide an improved tool arranged to store and dispense dissimilar connectors in a single tool body.

It is a further object of this invention to provide a single extrusion tool having a multiple feed arrangement for selectively dispensing separately stored connectors into a single extrusion zone upon selective manipulation of a dispensing mechanism employed therewith.

It is still another object of this invention to provide a selective dispensing mechanism in an extrusion tool or the like wherein selection is accomplished by the manipulation of a cam means cooperative with the tool plunger.

It is yet a further object of this invention to provide an improved extrusion tool having plunger means cooperative with a selective dispensing mechanism to provide a multiple feed arrangement for connectors stored in discrete connector receiving apertures in said tool.

Other objects and features will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose, by way of example, the principle of the invention and the best mode contemplated for carrying it out.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view, partly cut away and partly in section, of an extrusion tool showing the incorporation therein of a selective dispensing mechanism constructed in accordance with the concepts of the invention.

FIG. 2 is a front elevational view, partly cut away and partly in section, of the front end of the device illustrated in FIG. 1.

FIG. 3 is a fragmentary bottom plan view, in section, showing the selective dispensing mechanism of the device of FIG. 1.

FIG. 4 is a front elevational view, partly in section, taken along the line 4—4 of FIG. 1.

FIG. 5 is a front elevational view, in section, taken along the line 5—5 of FIG. 1.

FIG. 6 is a fragmentary front elevational view, in section, of a further embodiment of the biasing means of a selective dispensing mechanism constructed in accordance with the concepts of the invention.

FIG. 7 is a fragmentary bottom plan view, partly in section, of a further embodiment of the biasing means of a selective dispensing mechanism constructed in accordance with the concepts of the invention.

FIG. 8 is a fragmentary bottom plan view, partly in section, of yet another embodiment of a selective dispensing mechanism constructed in accordance with the concepts of the invention.

FIG. 9 is a fragmentary perspective view of a further embodiment of a selective dispensing mechanism constructed in accordance with the concepts of the invention.

Similar elements are given similar reference characters in each of the respective drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to FIGS. 1, 2, 3, 4 and 5 there is shown an improved extrusion tool 20 constructed in accordance with the concepts of the invention. The tool 20 comprises a body portion 22, a plunger 24 reciprocatingly movable in the body portion 22, a support member 26 attached to the plunger 24 and coupled to a handle 28 connected to the plunger support 26 by a link 30 so that as the handle 28 is depressed towards the body portion 22 of tool 20 the plunger 24 is caused to advance forwardly towards a nose portion 32 at the front end of the tool 20. A return spring 34 is located within the tool body portion 22 and bears against the support member 26 to bias the plunger 24 in a rearward position substantially as shown, and to return the plunger 24 and the handle 28 to their normal or rest positions upon release of the handle 28 after operation of the tool 20. As shown in greater detail in FIG. 3 a forward portion of the plunger 24 has affixed thereto a support 36 to which is attached a cam means 38 comprising a slide member 40 movable transverse to the longitudinal axis of the plunger 24. Threadably attached to the slide member 40 is an adjusting means 42 extending generally parallel to the longitudinal axis of the plunger 24 and having a first end 44. Disposed forwardly of the cam means 38 and attached to the body portion 22 of the tool 20 are a pair of opposingly disposed arms 46 and 48, each pivotable about a respective pivot means 50, 52 which, in particular embodiment illustrated, comprises a threaded screw member extending through an associated aperture in a finger portion 54 and 56 respectively, disposed generally normal to both the plane and the longitudinal axis of the arms 46 and 48 and extending inwardly towards the center of the tool body portion 22. Each of the pivot means 50 and 52 are engaged into suitably threaded holes in the tool body portion 22 to provide a pivot or fulcrum for each of the arms 46 and 48. Extending inwardly from each of the arms 46 and 48 generally intermediate its length is a flanged portion 58, 60, suitably apertured to provide a support for a respective end of a biasing means shown in FIG. 3 as an extension spring 62 which biases each of the arms 46 and 48 into a first position generally adjacent the sides of the tool body portion 22. Each of the arms 46 and 48 further comprises a free end 64, 66, respectively, terminating in an offset portion 68, 70 respectively, which flank an extrusion orifice 72 coaxial with the plunger 24 and extending generally longitudinally through the nose portion 32. Disposed on opposing sides of the orifice 72 and generally adjacent thereto is a first connector receiving aperture 74 and a second connector receiving aperture 76 each adapted to accommodate one or more connectors as will be explained in greater detail hereafter. The lower end of each of the connector receiving apertures 74 and 76 opens into a passageway connecting each of the connector receiving apertures with the extrusion orifice 72. Accordingly, a connector disposed in either one of the connector receiving apertures 74 or 76 may pass through its respective aperture into the passageway and be moved into a position generally adjacent the orifice 72 for extrusion therethrough. Normally, this passageway is blocked by an intermediate portion of each of the arms 46 and 48, as at 78 and 80 (FIG. 3). However, upon manipulation of a selected arm to its second or dispensing position, the blockage is removed and a connector (not shown) seated within the connector receiving aperture 74 is now free to enter the passageway between the connector receiving aperture 74 and the extrusion orifice 72. As the arm 46 returns to its first or rest position, the offset portion 68 will engage the connector in the passageway and transfer it into a position directly adjacent the orifice 72, as shown by the dotted outline 82 in FIG. 3. The connector is thus at least partially cradled between the offset portions 68 and 70 of the arms 46 and 48 as the plunger 24 is retracted to its initial position, Deflection of each of the arms 46 and 48 from its first or rest position to its second or dispensing position is accomplished in the following manner. As the plunger 24 is moved forwardly or towards the right as viewed in FIG. 3, the first end 44 of the adjusting means 42 is caused to contact one of the finger portions 54 and 56 of the arms 46 and 48, respectively, depending upon the position of the cam means slide member 40. For the sake of illustration the slide member 40 is shown in FIG. 3 as being selectively positioned to contact the finger portion 54 of arm 46, and the displacement of the slide member 40 and its associated adjusting means 42, in response to the movement of the plunger 24, is shown by the dotted outline to the right of the solid outline depicting those elements, as viewed in FIG. 3. As the first end 44 of the adjusting means 42 contacts the finger portion 54, the arm 46 is caused to pivot about the pivot means 50 to assume a position essentially as shown by the dotted outline 84. Plunger 24 further comprises front portion 86 which, during the forward stroke, is caused to engage the connector 82 seated adjacent the orifice 72 to forcibly advance the connector thereinto so that a conductor (not shown) inserted through the orifice 72 and into the connector 82 is engaged securely therewithin in a manner essentially as described in greater detail in U.S. Pat. No. 3,674,392 cited hereinabove. Upon retraction of the plunger means 24, the adjusting means 42 is moved

rearwardly sufficiently to release the finger portion **54**, so that the arm **46**, under the influence of the biasing spring **62**, is caused to pivot back about the pivot means **50** to its original position shown by the solid outline **46** in FIG. **3**. A connector which has previously entered the passageway between the connector receiving aperture **74** and the extrusion orifice **72** is thus engaged by the offset portion **68** of the arm **46** and transferred to a position directly adjacent the extrusion orifice **72** as illustrated in FIG. **3**. By displacing the slide member **40** to the left as viewed in FIG. **4**, and as shown by the dotted outline **88**, the adjusting means **42** is caused to move correspondingly to assume the position shown by the dotted outline in FIG. **4**. In this position the first end **44** of the adjusting means **42** will contact the finger portion **56** of the arm **48** upon advancement of the plunger means **24** so that the arm **48** will undergo a pivoting movement essentially similar to that described above with respect to the arm **46** as the plunger means **24** is advanced forwardly in the tool body portion **22**. Similarly, upon retraction of the plunger means **24** the arm **48**, under the influence of the biasing spring **62**, will return to its first or rest position as shown by the solid outline **48** in FIG. **3**. To regulate the spacing between the offset portions **68** and **70** of the first and second arms **46** and **48**, respectively, each of the arms is provided with an extension **90, 92**, respectively, (see FIG. **2**) the free end of which is selectively formed to abut on adjacent side of the tool body portion **22** when each of the arms **46** and **48** is in its rest position. Accordingly, the pressure exerted by the offset portions **68** and **70** against the connector **82** cradled therebetween may be readily controlled by suitably adjusting the extending portions **90** and **92**. To provide free movement of the first ends **64** and **66** of the arms **46** and **48**, respectively, within the tool body portion **22** there are provided corresponding openings **94** and **96** shown in the sectional view in FIG. **5**. Each of the openings **94** and **96** extends rearwardly sufficiently to also accept the flanged portions **58** and **60** which provide support for the biasing spring **62**. In an alternative embodiment illustrated in FIG. **6** the biasing spring **62** may be replaced by a pair of torsion springs each cooperable with a respective one of the arms **46** and **48** and the tool body portion **22**. For the sake of convenience, there is shown in FIG. **6** one side of such an arrangement wherein a torsion spring **98** is shown disposed about a portion of the shank of the pivot means **50**. One end **100** of the torsion spring **98** engages its respective arm **102** while the other end **104** is coupled to the tool body portion **22**. Thus, each of the dispensing arms is independently biased to its first or rest position. A further alternative embodiment of biasing means is illustrated in FIG. **7** wherein there is provided a pair of flat springs **106** and **108** each attached to an associated side of the tool body portion **22** by a fastener **110, 112**, respectively. Each of the springs **106** and **108** comprises a free end **114, 116**, respectively, bearing against a respective dispensing arm **118** and **120** to bias the arms **118** and **120** into their first or rest positions. In FIG. **7** the arm **118** is shown in its second or dispensing position having been pivoted about its pivot means **50** by engagement with the adjusting means **42** during the operating stroke of the plunger **24**. Accordingly, the spring **106** has been deflected out of its original position by the arm **118** whereby, upon retraction of the plunger **24** and the corresponding disengagement of the adjusting means **42** with the finger portion of the arm **118**, the spring **108** will return the arm **118** to its first or rest position.

Turning now to FIG. **8** the rigid arms **46** and **48** may be replaced by resilient spring-like arms **122** and **124** suitably formed to provide a cam engaging surface **126** and **128**, respectively, arranged to be contacted by the adjusting means **42** upon selective advancement of the plunger **24** during the operating stroke. Each of the arms **122** and **124** is fastened to the tool body portion by an associated fastener **130** and **132**, respectively. In this arrangement, the adjusting means **42** is shown as selectively positioned to contact the arm **122** which is caused to be deflected outwardly as shown, for example, by the dotted outline **134** depicting the deflected position of the arm **122** after engagement by the end **44** of the adjusting means **42**. The subsequent operation of the selective dispensing mechanism is essentially duplicative of that described hereinabove.

Turning now to FIG. **9** each of the connector receiving apertures **74** and **76** may have provided therewith cover portions **135** and **136** disposed over the opening formed by the communication of each of said apertures **74** and **76** with the outer surface of the tool body portion **22**. The cover portions **135** and **136** may each be pivotably coupled to the tool body portion **22** by a fastener such as **138, 140**, respectively, and may further comprise an extension **142, 144**, respectively, for manipulating each of the cover portions **135** and **136** towards and away from the respective connector receiving apertures **74** and **76** to permit loading and retention of selective connectors therewithin. Although not shown, the fasteners **138** and **140** may comprise elongate members spring loaded within respective apertures in the tool body portion **22** so that each of the cover portions **135** and **136** may be lifted away from the tool body portion **22** during the loading operation and then be released to rest upon the uppermost of said connectors, thereby applying a downward force to such connectors to assist in feeding the connectors into the passageway adjacent the extrusion orifice.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an extrusion tool of the type having a body portion, plunger means reciprocatingly movable in paid body portion, a nose portion adjacent one end of said body portion and having an orifice for receiving one end of said plunger means therein to extrude a connector through said orifice, the improvement comprising: a first arm having a first end and a second end; a second arm having a first end and a second end, each of said first and said second arms being pivotably coupled adjacent opposite sides of said body portion for movement towards and away from said body portion; biasing means cooperative with said first and said second arms for maintaining said first end of each of said first and said second arms in selectively spaced opposing relationship in a first position generally adjacent said nose portion orifice; said body portion having a first and a second connector receiving aperture, said apertures being disposed on opposite sides of said nose portion orifice and communicating therewith, each of said first and said second arms providing a blockage between a respective one of said first and said second connector receiving apertures and said nose portion orifice in said first position, each of said first and said second arms

being selectively and independently movable to a second position providing access between a respective one of said first and said second connector receiving apertures and said nose portion orifice; and cam means cooperative with said plunger means for movement therewith, said cam means being selectively positionable to engage and move a selective one of said first and said second arms from said first position to said second position upon selective movement of said plunger means.

2. The improvement as defined in claim **1** wherein said cam means is selectively positionable between a first position and a second position in a direction generally normal to the longitudinal axis of said plunger means.

3. The improvement as defined in claim **1** wherein said cam means comprises adjusting means for controlling the engagement between said cam means and a respective one of said first and said second arms.

4. The improvement as defined in claim **3** wherein said adjusting means comprises an elongate member having a first end arranged to engage a selective one of said first and said second arms.

5. The improvement as defined in claim **4** wherein said elongate member further comprises an externally threaded portion engaging a complimentarily threaded aperture in said cam means for adjustment generally parallel to the longitudinal axis of said plunger means.

6. The improvment as defined in claim **1** wherein said biasing means comprises a spring member, and said first and second arms each comprise a flanged portion, each end of said spring member engaging a respective one of said flanged portions.

7. The improvement as defined in claim **1** wherein each of said first and said second arms comprises a finger portion arranged to be engaged by said cam means to selectively move said first and said second arms from their said first position to their said second position.

8. The improvement as defined in claim **1** wherein each of said first and second arms are pivotable about a fulcrum located inwardly of each of the respective sides of said body portion.

9. The improvement as defined in claim **8** wherein said fulcrum comprises an elongate member coupled to said body portion and having a shank portion extending through a transverse aperture in a respective one of said first and said second arms generally adjacent said second end thereof.

10. The improvement as defined in claim **1** wherein said first and second arm first ends are arranged to provide support means for a connector disposed therebetween.

11. The improvement as defined in claim **1** further comprising stop means extending inwardly from each of said first and said second arms for engagement with a respective side of said body portion to control the spacing between said first and said second arm first ends in said first position.

12. The improvement as defined in claim **1** wherein said biasing means comprises a first spring means and a second spring means, each of said first and said second spring means being coupled to said body portion and arranged to selectively independently bias a respective one of said first and said second arms toward said first position.

13. The improvement as defined in claim **12** wherein each of said first and said second spring means comprises an elongate resilient member having one end coupled to said body portion and the other end abutting a respective one of said first and said second arms.

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