United States Patent [19]

Eppler

[11] **3,880,051**

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[54] **PNEUMATIC SYSTEM INCLUDING AUXILIARY OUTPUT**

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[73] Assignee: **Thomas & Betts Corporation,** Elizabeth, N.J.

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[52] **U.S. Cl.** ..... **91/411 R;** 91/413; 92/151; 60/407

[51] **Int. Cl.** **F15b 11/20**

[58] **Field of Search** ..... 60/370, 380, 407; 91/411 R, 355; 92/146, 151, 152

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Primary Examiner—Edgar W. Geoghegan
Attorney, Agent, or Firm—David Teschner; Jesse Woldman

[57] **ABSTRACT**

A pneumatic system applicable for pneumatically powered tools or the like comprises a pair of reciprocating slidable pistons arranged in tandem-like fashion within respective forward and rear chambers of a main cylinder. A two position valve means is selectively operable to divert the incoming pneumatic fluid to either of the two chambers while simultaneously diverting the exhaust therefrom to an auxiliary output. Pressurization of the forward chamber in the forward stroke is accomplished by providing a passageway through the rear piston for channeling the pressurized fluid into the forward chamber to employ the composite thrust of both pistons during the work cycle. On the back stroke, the rear piston is returned to its initial position by engagement with the rearwardly moving front piston upon selective pressurization of the front chamber. An auxiliary cylinder may be coupled to the auxiliary output for selective pressurization thereof whereby the auxiliary cylinder may further comprise a feed mechanism selectively sequenced by the pressure developed in the auxiliary output. The system may also include a pressure reducer for further selectively pressurizing the auxiliary output to provide a selectively cycled low level pressure in the auxiliary cylinder.

22 Claims, 11 Drawing Figures

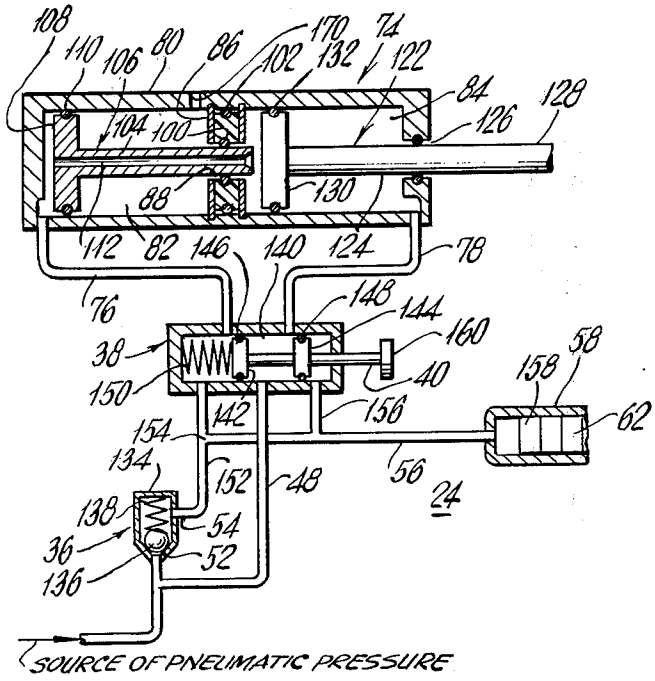


Fig. 1.

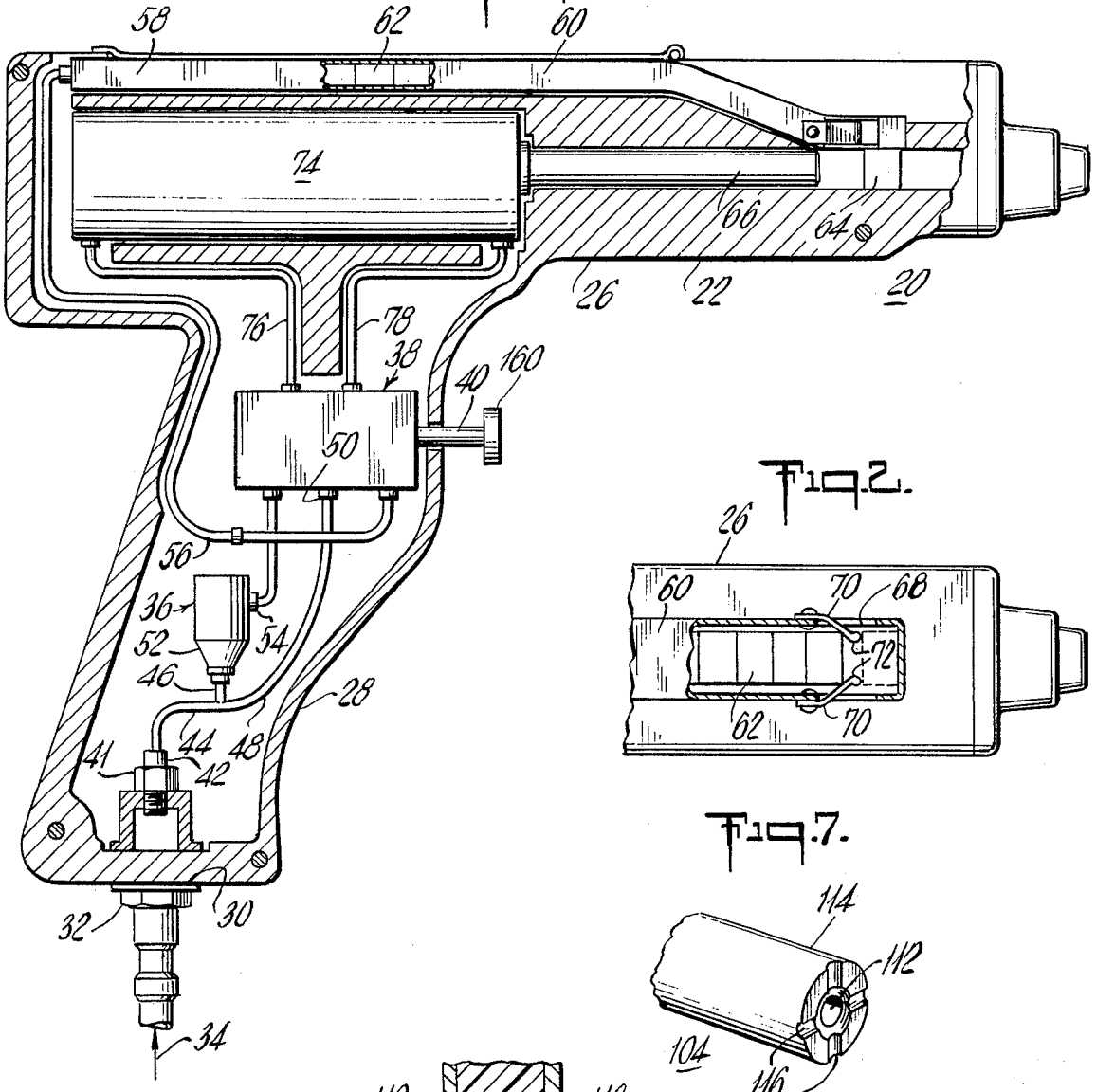


Fig. 2.

Fig. 7.

Fig. 8.

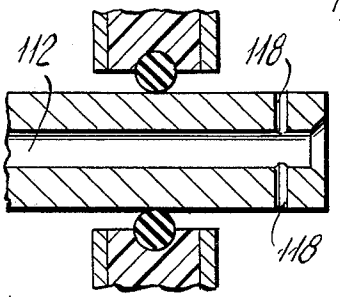


Fig. 9.

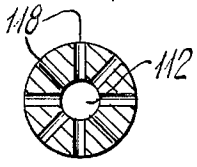


Fig. 10.

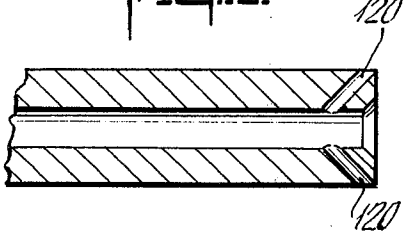


Fig. 3.

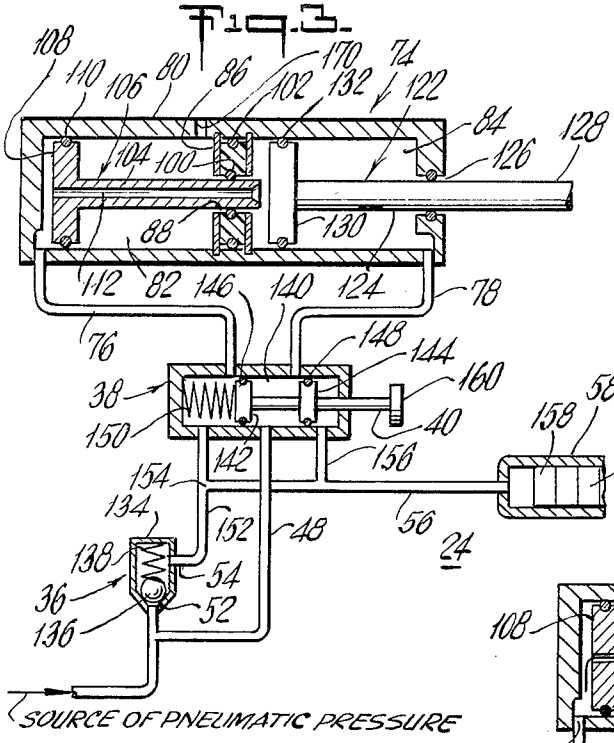


Fig. 4.

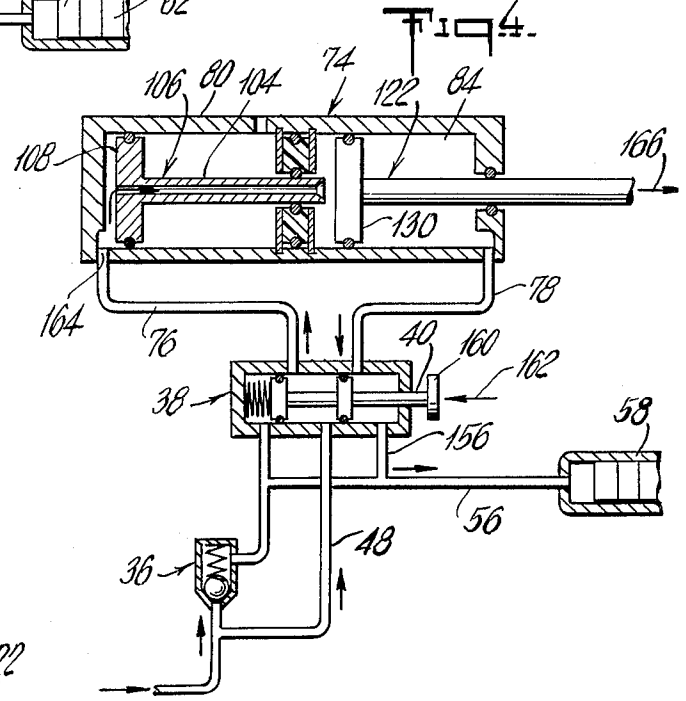


Fig. 5.

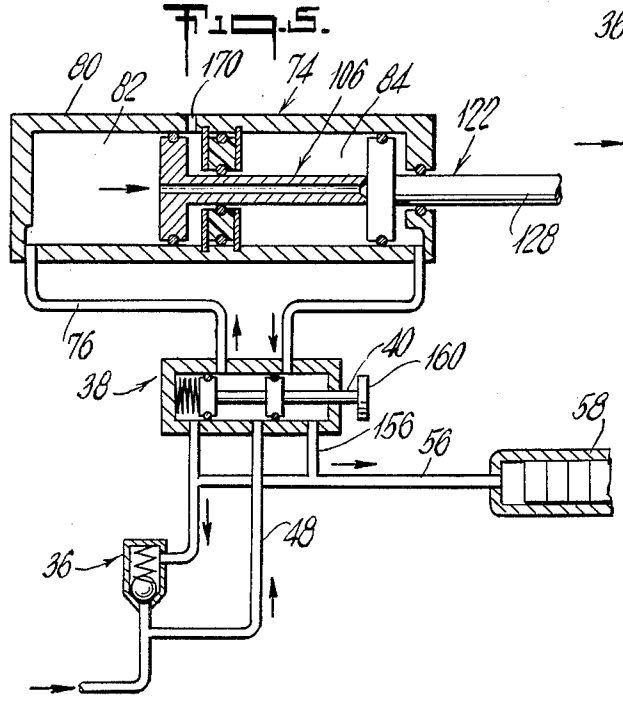


Fig. 6.

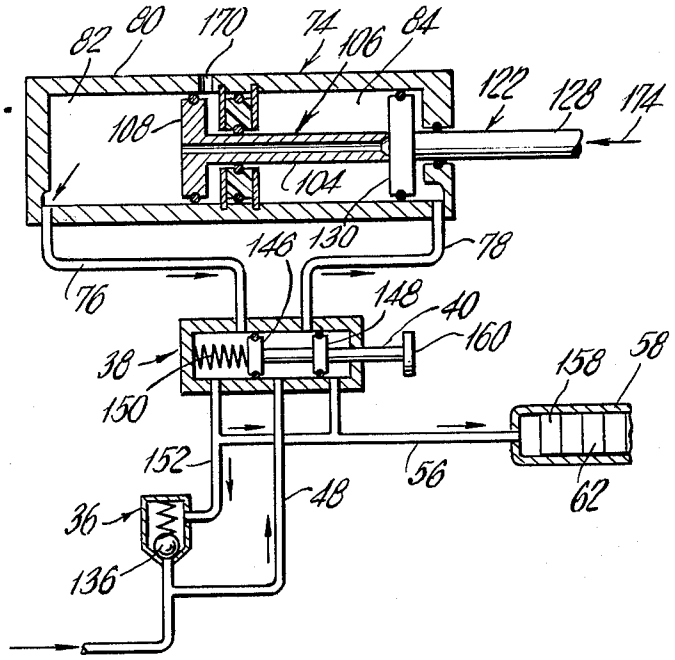
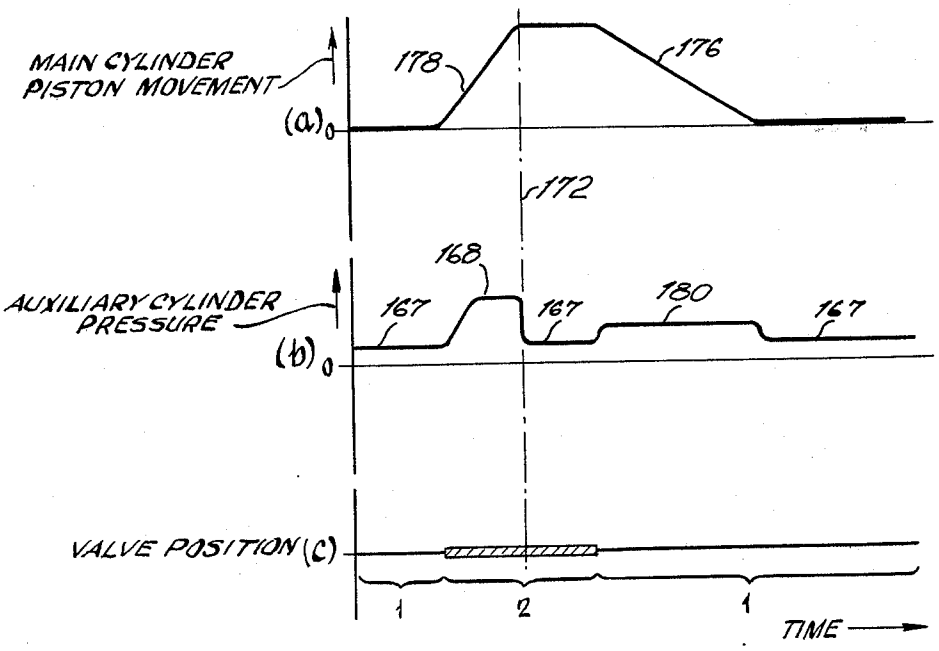

82
80
170
74
106
84
122
128
174
108
104
146
130
78
76
148
40
160
38
150
158
58
152
56
62
48
36
136

Fig. 11.


MAIN CYLINDER PISTON MOVEMENT
178
176
(a)
0
172
AUXILIARY CYLINDER PRESSURE
168
167
167
180
167
(b)
0
VALVE POSITION (C)
1
2
1
TIME

PNEUMATIC SYSTEM INCLUDING AUXILIARY OUTPUT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to the field of pneumatic systems employable with pneumatically powered tools or the like.

2. Description of the Prior Art

The speed, convenience, and simplicity of pneumatically powered tools has contributed in large measure to the volume of such tools presently in production and in use in many applications. Complexities arise, however, where it is desired to pneumatically power separate mechanisms from the same pressure source in a selectively timed sequence to insure proper correspondence between the various parts of such mechanisms. There are often employed complex mechanical mechanisms including springs, linkages, clutches and the like cooperative with the tool plunger to provide the additional functions required. Because of the susceptibility of such mechanisms to mechanical malfunction, such as wear, jamming and improper alignment or the like, such devices often require extensive repair and maintenance to insure proper continuous operation. The additional mechanisms required in such devices also contribute substantially to increased cost, weight and bulkiness, features which are highly undesirable in portable tools for use either in factory or field applications.

SUMMARY OF THE INVENTION

The invention overcomes the difficulties and limitations noted above with respect to prior art devices by providing a pneumatic system comprising tandemly operated piston means operable in respective cylinders whereby the exhaust output therefrom is selectively diverted to an auxiliary output for the selective pressurization thereof to provide a composite system for pneumatically powered tools or the like which is simpler, cheaper, more reliable, and more trouble free than such prior art devices. The main cylinder comprises a divider separating the interior thereof into a first chamber and a second chamber arranged in coaxial alignment. A pair of pistons arranged in tandem-like fashion are slidably disposed within their respective chambers with a suitably orificed terminating end of the shank portion of the rear piston extending through a generally transverse aperture in the divider and into the front chamber when both pistons are in their fully retracted position. The rear piston has a longitudinally extending bore therethrough to provide a passageway for pneumatic fluid entering the rear chamber so that upon selective pressurization of the rear chamber a portion of the pneumatic fluid flowing therethrough is directed into the front chamber to energize the front piston. Depending upon the work to be performed, the front piston may supply the energizing force solely by virtue of the pressure exerted thereon or may be assisted by the force of the second piston bearing thereagainst during the forward stroke. A manually controllable valve means is operationally selective to divert the incoming pressurized fluid to either the front or rear chamber while diverting the exhaust fluid to an auxiliary output which may be coupled to an auxiliary cylinder which may comprise a feed mechanism selectively energized by the exhaust pressure to align and feed work pieces contained therein in accordance with a predetermined pressure cycle. The source of pressurized fluid may be further coupled to a pressure reducer whose output may be channeled to the auxiliary output to provide a predetermined constant pressure to the auxiliary cylinder during periods when the system is in its rest position. It is therefore an object of this invention to provide an improved pneumatic system.

It is another object of this invention to provide a pneumatic system having tandemly arranged pistons serially operative from a single pressurized source of pneumatic fluid.

It is a further object of this invention to provide a pneumatic system having a selectively pressurized auxiliary output.

It is yet another object of this invention to provide a means to selectively pressurize the individual chambers of the main cylinder of a pneumatic system while providing coordinating energization of each of the respective pistons slidably disposed within the cylinder.

It is still another object of this invention to provide a pneumatic system having valve means operable between a first and a second position to selectively divert the exhaust fluid from each of a pair of chambers in a main cylinder to an auxiliary output to provide selective pressurization thereof.

It is yet a further object of this invention to provide a pneumatic system in which an auxiliary output is selectively pressurized in accordance with a predetermined sequence coordinated with the movement of a tandem piston arrangement.

It is still another object of this invention to provide a pneumatic system for pneumatically powered tools or the like wherein serially operated, tandemly disposed pistons selectively cooperate to activate a plunger means for operation on a workpiece.

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 a pneumatically powered tool having a pneumatic system constructed in accordance with the concepts of the invention.

FIG. 2 is a fragmentary top plan view, partly cut away and partly in section, of a portion of the feed mechanism of the device of FIG. 1.

FIG. 3 is a diagrammatic view of the pneumatic system of FIG. 1 showing the respective elements in an initial or rest position.

FIG. 4 is a diagrammatic view of the system of FIG. 1 showing the direction of fluid flow when the valve means is operated from its first to its second position.

FIG. 5 is a diagrammatic view of the pneumatic system of FIG. 1 showing the relative position of the respective elements therein after operation of the valve means from its first to its second position.

FIG. 6 is a diagrammatic view of the pneumatic system of FIG. 1 showing the pneumatic fluid flow when the valve means is moved from its second position to its first position.

FIG. 7 is a fragmentary perspective view showing a further embodiment of the shank portion of a first pis-

ton means of a pneumatic system constructed in accordance with the concepts of the invention.

FIG. 8 is a fragmentary side elevational view, in section, of a further embodiment of the shank portion of a first piston means of a pneumatic system constructed in accordance with the concepts of the invention.

FIG. 9 is a front sectional view of the device of FIG. 8.

FIG. 10 is a fragmentary side elevational view, in section, of yet another embodiment of the shank portion of a first piston means of a pneumatic system constructed in accordance with the concepts of the invention.

FIG. 11 is a graphic representation showing the relationship between piston movement and auxiliary cylinder pressure of a pneumatic system 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, 5, and 6 there is shown a tool 20 (FIG. 1) having a housing 22 within which is incorporated a pneumatic system 24 (FIG. 3) constructed in accordance with the concepts of the invention. The housing 22 has a general pistol-like configuration and includes a barrel portion 26 to which is attached a handle portion 28 suitably apertured as at 30 to receive a fitting 32 adapted to receive thereat a source of pneumatic pressure in a direction indicated by the arrow 34. Although the pneumatic system described hereafter may be employed with a variety of types and shapes of pneumatic tools, for the sake of convenience the sytem will be described in detail with respect to the pistol-like tool configuration shown herein merely as a matter of illustration and not as a limitation of the type and shape of tool applicable therewith. As further illustrated in FIG. 1, the source of pressurized pneumatic fluid 34 is coupled through the fitting 32 to both a pressure regulating means 36 and a valve means 38 located within the handle portion 28 of the tool 20. The valve means 38 comprises a plunger means 40 selectively operable to cause selective diversion of the pneumatic fluid in a manner to be described in more detail hereafter. The fitting 32 comprises a threaded connection 41 having a projection 42 to which is coupled a conduit 44 which has a first branch 46 coupled to the pressure regulating means 36 and a second branch 48 coupled to the valve means 38, as at 50. The branch 46 of the conduit 44 is coupled to an inlet port 52 of the pressure regulating means 36 which also comprises an outlet port 54 providing a regulated source of pressurized fluid to an auxiliary output line 56 which feeds an auxiliary cylinder means 58 comprising a feed tube 60 which may be loaded with a plurality of workpieces 62 for advancement into a work chamber 64 for engagement with the tool plunger 66 as further illustrated in detail in FIG. 2. The feed tube 62 has coupled thereto at a forward end 68 a pair of retainers 70 formed preferably from resilient spring material. Each retainer 70 is suitably formed so as to provide an inturned end 72 at the termination thereof wherein the spacing between the inturned ends 72 is somewhat less than the width of the workpieces 62. Accordingly, the workpieces 62 are prevented from advancing beyond the ends 72 of the retainer 70 until urged forwardly by an external force. The means by which the workpieces 62 are selectively advanced into the work chamber 64 will be described in greater detail hereafter. As further illustrated, the valve means 38 is coupled to a main cylinder means 74 by way of conduits 76 and 78 to provide selective pressurization thereof. As shown in detail in FIG. 3 the main cylinder means 74 comprises a housing 80 having a first or rear chamber 82 and a second or front chamber 84, the front and rear chambers 84 and 82, respectively, being isolated from one another by a divider means such as an annular ring 86 having a transverse aperture 88 extending therethrough. The ring 86 is provided with both an inner seal 100 extending circumferentially about the aperture 88 and an outer seal 102 extending between the external surface of the ring 86 and the inner wall of the main cylinder means 74. A shank portion 104 of a first or rear piston means 106 extends partially through the aperture 88 of the ring 86 in a rest position substantially as shown in FIG. 3 so that the seal 100 provides a bearing support for the shank portion 104 of the rear piston means 106. The piston means 106 further comprises a head portion 108 having circumferentially disposed thereabout a seal 110 for sliding engagement with the inner surface of the main cylinder means 74. Extending through the first or rear piston means 106 is a passageway 112 selectively bored to provide a conduit for pneumatic fluid in a manner to be described in greater detail hereafter. As shown in detail in FIG. 7, the rear piston means shank portion 104 is provided with a terminating end 114 having grooves 116 which extend from the passageway 112 radially outwardly to the outer surface of the terminating end 114 of the shank portion 104 to at least partially divert the pneumatic fluid flowing through the passageway 112 for pressurization of the second or front chamber 84. As further illustrated in FIG. 8, the grooved portions 116 may be replaced by radially extending bores 118 which are disposed slightly rearwardly of the end face of the shank portion of the rear piston means to similarly divert the pneumatic fluid flowing through the passageway 112. In the sectional view shown in FIG. 9, the radially extending bores 118 are shown as extending in a symmetrical pattern outwardly from the passageway 112 to provide a spoke-like configuration essentially as shown. It will of course be clear that the arrangement illustrated may be varied to comprise either one or more such bores 118 in either symmetrical or unsymmetrical patterns as necessary or desirable. Furthermore, although each of the bores 118 is shown as extending generally normal to the longitudinal axis of the shank portion 104, obliquely angled bores 120, as illustrated, for example, in FIG. 10 may be employed to provide a further embodiment in accordance with the concepts of the invention. It will of course be readily apparent to those skilled in the art that a combination of grooves and bores, such as 116, 118, and 120 may be employed in any suitable arrangement at the terminating end of the first piston means shank portion without departing from the spirit of the invention and within the concepts herein disclosed. Slidably disposed within the front or second chamber 84 (FIG. 3) is a front or second piston means 122 having a shank portion 124 extending through an orifice 126 in the main cylinder means 74 to provide an extension 128 either coupled to or formed so as to provide the plunger 66 described hereinabove with respect to the embodiment

illustrated in FIG. 1. The front or second piston means 122 further comprises a head portion 130 similar to the head portion 108 of the first or rear piston means 106 and preferably of equal diameter. A seal 132 is disposed about the head portion 130 of the second or front piston means 122 and suitably proportioned to provide a sliding fit between the head portion 132 and the inner surface of the main cylinder means 74. As further illustrated in detail in FIG. 3, the pressure regulating means 36 comprises a housing 134 having an inner chamber in which is disposed a biased ball member 136 selectively seated at the inlet portion 52 and resiliently biased thereagainst by a spring 138 to selectively control the flow of pressurized fluid therethrough. The valve means 38 comprises an inner chamber 140 in which are slidably disposed a first diverter means 142 situated at one end of the plunger means 40 and a second diverter means 144 spaced rearwardly from the first diverter means 142, said diverter means 142 and 144 being arranged to selectively divert the pneumatic fluid flowing within the inner chamber 140 of the valve means 38. The first and second diverters 142 and 144 are formed preferably as annular rings each comprising a seal 146, 148, respectively, extending circumferentially thereabout to provide a sealed sliding fit with the inner surface of the chamber 140. The plunger means 40 is biased towards the right in FIG. 3 in a first or rest position under the influence of biasing means such as a compression spring 150 disposed between the first diverter means 142 and the opposing inner wall of the valve means 38. As further illustrated in FIG. 3, the valve means 38 is coupled to the outlet port 54 of the pressure regulating means 36 by a conduit 152 which also joins the valve means 38 with the auxiliary output line 56 at the junction 154. A further conduit 156 couples the auxiliary output line to the valve means 38 just behind or to the right, as viewed in FIG. 3, of the second diverter means 144. Accordingly, in the operational state illustrated in FIG. 3 and designated as the rest position, the incoming pressurized fluid is directed through the conduit 48 into the inner chamber 140 of the valve means 38 and then out through the line 78 to the second or front chamber 84 of the main cylinder means 74 to apply a force against the underside of the head portion 130 of the front or second piston means 122 in a direction to urge it rearwardly or towards the left, as viewed in FIG. 3, thereby causing the rear or first piston means 106 to be moved in the same direction upon the contact of its shank portion 104 with the head portion 130 of the front piston means 122. In this manner the second or front chamber 84 of the main cylinder means 74 is maintained under continuous pressure so that the front and rear piston means 122 and 106, respectively, are held in their retracted position, substantially as shown. The output of the pressure regulating means 36 is coupled by way of the conduit 152 to the auxiliary output line 56 to provide a constant low pressure thereat when the system is in the rest position indicated in FIG. 3, whereby the low pressure pneumatic fluid in the auxiliary output line 56 is applied against an auxiliary piston means 158 slidably disposed within the interior of the auxiliary cylinder means 58. To permit convenient manual manipulation of the plunger means 40 there is provided an enlarged head portion 160 at one end of the plunger means 40, the head portion 160 protruding outwardly from the valve means 38 for selective engagement by the user.

Referring now specifically to FIG. 4, the plunger means 40 is shown displaced to a second position by applying a force to the head portion 160 in a direction indicated by the arrow 162. The pneumatic fluid is now diverted from the second or front chamber 84 to the first or rear chamber 82 via the conduit 76, the pressurized fluid entering the first or rear chamber 82 by way of a port 164 extending through the main cylinder housing 74 substantially as shown in FIG. 4. The fluid is thus caused to enter the space behind the head portion 108 of the first or rear piston means 106 to apply a force to the piston means 106 urging it towards the right, as viewed in FIG. 4. A portion of the fluid entering through the port 164 is diverted through the piston shank passageway 112 into the front or second chamber 84 to impinge against the head portion 130 of the second or front piston means 122, thereby causing the second piston means 122 to similarly be urged towards the right, as viewed in FIG. 4, in a direction indicated by the arrow 166. The static fluid previously occupying the front chamber 84 is caused to exit therefrom by way of the conduit 78 and is conducted through the valve means 38 into the conduit 156 and then into the auxiliary output line 56 to the auxiliary cylinder means 58. In FIG. 11 there is shown a graph depicting the pressure variation in the auxiliary cylinder means 58. The interval indicated in FIG. 11 (*c*) as position 1 for the valve 38 results in a pressurization of the auxiliary cylinder indicated in FIG. 11 (*b*) by the horizontal line 167 which is essentially equal to the output of the pressure regulating means 36. Upon movement of the second piston 122, the pressure is caused to increase due to a compression of the pneumatic fluid in the second chamber 84, such pressure being indicated by the level 168 in FIG. 11 (*b*) and reaching a maximum during the forward or extending stroke of the second piston 122 so that further motion of the second piston 122 with generally cause no further increase in the pressure in the auxiliary output line 56 and consequently, in the auxiliary cylinder 58 coupled thereto. In the event the second piston means 122 is prevented from free movement forwardly in a direction indicated by the arrow 166, the first piston 106, being unobstructed in its movement, will be accelerated somewhat above the speed of the second piston 122 so that the terminating end of the shank portion 104 of the first piston means 106 will be caused to abut the head portion 130 of the second piston means 122 whereby the force exerted by both the first piston means 106 and the second piston means 122 will be applied to the extending portion of the shank portion 124 of the second piston means 122 for operation on a workpiece situated at the terminating end of the plunger means 66 shown in FIG. 1. In this manner the work to be done by the plunger means 66 is thus accomplished by the total driving force available from both the first piston means 106 and the second piston means 122, both cooperating to produce a total force equal to the sum of the forces exerted on each of the piston head portions 108 and 130, respectively, of the first and second piston means 106 and 122. As further illustrated in FIG. 11 (*b*), the pressure built up in the auxiliary output line 56, and consequently in the auxiliary cylinder 58, reaches a maximum before the end of the forward stroke of the second piston means 122 and is arranged to provide a force sufficient to eject a workpiece 62 from between the terminating ends 72 of the retainers 70 shown in FIG. 2 and into the

work chamber **64.** As the second piston means **122** reaches the end of its stroke, the flow of fluid from the second chamber **84** ceases, whereby the auxiliary output line pressure drops to the low pressure valve indicated as **167** which is supplied from the low pressure output of the pressure regulating means **36.** This pressure, although insufficient to eject the workpieces **62** from the feed tube **60,** is applied against the auxiliary piston means **158** with sufficient force to maintain the workpieces **62** in properly aligned and stacked condition within the feed tube **60** regardless of the orientation of the tool **20.** The extreme forward position of the first and second piston means **106** and **122** are shown in the diagrammatic representation in FIG. **5.** Each of the piston means **106** and **122** have been advanced to the right, as viewed in FIG. **5,** whereby the fluid previously occupying the rear or first chamber **82** is exhausted through an exhaust port **170** communicating with the rear or first chamber **82.** A vertical line **172** extending from the bottom to the top of FIG. **11** indicates the point in the operating cycle where each of the piston means **106** and **122** reached the end of their forward travel causing the auxiliary cylinder pressure to drop to the low pressure level indicated as **167** despite continued depression of the plunger means **40.** Upon the release of the plunger means **40,** the biasing means **150** operate to return the first and second diverter means **146,** and **148,** respectively, to their initial or rest position substantially as shown in FIG. **6.** The source of pneumatic pressure is now caused to be conducted through the conduit **48** through the valve means **38** and the conduit **78** into the second or forward chamber **84** of the main cylinder means **74** and impinges against the undersurface of the head portion **130** of the second piston means **122,** driving the second piston means **122** to its retracted position or to the left, as viewed in FIG. **6,** in the direction indicated by the arrow **174.** The head portion **130** of the second piston means **122** will thus be caused to abut the terminating end of the first piston means shaft portion **104** thereby urging the first piston means **106** towards its retracted position in response to the movement of the second piston means **122.** As the first piston means **106** is driven rearwardly towards its retracted position, the pneumatic fluid within the chamber **82** is forced out of the chamber **82** through the conduit **76,** thence into the valve means **38** and into the auxiliary output line **56** where it is conducted into the auxiliary cylinder means **58.** The rate of rearward movement of both the first and second piston means **106** and **122** is indicated by the sloping line **176** in FIG. **11** (*a*) which illustrates a slower rate of travel than occurs in the forward stroke illustrated by the sloping line **178** in FIG. **11** (*a*). This is due primarily to the fact that during the forward stroke pressurized pneumatic fluid is applied simultaneously to both the first and second chambers **82** and **84,** respectively, to independently energize both of the respective first and second piston means **106** and **122** whereas in the rearward stroke pressurized fluid is applied solely to the front or second chamber **84** so that the total force available to drive both piston means rearwardly to their retracted position is limited to the force applied to the underside of the head portion **130** of the second piston means **122,** such force being substantially less than the initial force applied to both piston heads during the forward stroke. Accordingly, the pneumatic fluid exhausted through the rear chamber **82** reaches a pressure indicated by the horizontal line **180** shown in FIG. **11** (*b*), which is somewhat less than the pressure indicated by the pressure level **168** in FIG. **11** (*b*). The retainers **70** are arranged to insure that the workpieces **62** are retained in position against the lower pressure level indicated by the line **180** in FIG. **11** (*b*). It should also be noted that the exhaust pressure from the rear or first chamber **82** is also directed into pressure regulating means **36** through the conduit **152** to internally pressurize the inner chamber **138** of the pressure regulating means **38** sufficiently to cause the ball means **136** to be urged against the seat **52** of the pressure regulating means **36** thereby disrupting the source of low pressure emanating therefrom so that the pressure in the auxiliary output line **56** is supplied solely from the rear or first chamber **82.** Upon completion of the rearward movement of both the first and second piston means **106** and **122,** respectively, the positional relationships of the elements of the pneumatic system are essentially as described above with respect to FIG. **3.** Since no further exhaust pressure is introduced into the pressure regulator inner chamber **138,** the pressure regulator **36** is returned to its normal operating state to supply a constant low pressure to the auxiliary output line **56** and the auxiliary cylinder means **58** as described heretofore. As the plunger means **40** is again depressed, the above described cycle will be repeated so that as the second piston means **122** is advanced forwardly from its retracted position the pressure built up in the auxiliary output line **56** will again follow the curve indicated in FIG. **11** (*b*) to provide predetermined cyclic feeding of the workpieces **62** from the feed tube **60** into the work chamber **64** in coordination with the operation of the first and second piston means **106** and **122,** respectively.

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

1. A pneumatic system for a pneumatically powered tool or the like comprising: a source of pneumatic pressure; main cylinder means having a first chamber and a second chamber, said first and said second chambers being arranged in generally coaxial alignment; selectively apertured divider means disposed within said main cylinder means for selectively isolating said first chamber from said second chamber; first piston means having a head portion and a shank portion and slidably disposed within said main cylinder means first chamber so that its shank portion extends through said divider aperture, there being a passageway extending through the length of said first piston means for permitting the passage of pneumatic fluid therethrough; second piston means having a head portion and a shank portion and slidably disposed within said main cylinder means second chamber in generally coaxial alignment with said first piston means, said second piston means having an extension at the terminating end of its shank portion protruding coaxially outwardly from said main cylinder means for operation on a workpiece, said first piston means passageway communicating at one end with said main cylinder means second chamber and communicating at its head end with said main cylinder means first chamber; valve means selectively coupling said pneumatic pressure source to said main cylinder means and operable between a first position in which said pneumatic pressure is coupled to said main cylinder means second chamber simultaneously with the cou-

pling of said first chamber to an auxiliary output, and a second position in which said pneumatic pressure source is coupled to said main cylinder means first chamber simultaneously with the coupling of said second chamber to said auxiliary output; said first and said second piston means being arranged for tandem-like operation upon the selective pressurization of said main cylinder means first and second chambers, said first and said second piston means being independently selectively advanced upon the operation of said valve means from said first position to said second position, said first and said second piston means being selectively retracted upon the operation of said valve means from said second position to said first position, movement of said first and said second piston means between said retracted and said extended positions causing selective pressurization of said auxiliary output.

2. A pneumatic system as defined in claim **1** wherein said valve means comprises biasing means for normally biasing said valve means in said first position.

3. A pneumatic system as defined in claim **1** further comprising auxiliary cylinder means coupled to said auxiliary output for selective pressurization therefrom in response to the movement of said first and said second piston means.

4. A pneumatic system as defined in claim **3** further comprising auxiliary piston means disposed within said auxiliary cylinder means for slidable movement therewithin.

5. A pneumatic system as defined in claim **1** further comprising pressure regulating means coupled between said pneumatic pressure source and said auxiliary output for further selectively pressurizing said auxiliary output.

6. A pneumatic system as defined in claim **5** wherein said pressure regulating means comprises a housing having an inlet port coupled to said pneumatic pressure source, the interior of said housing including means selectively biased towards said inlet port to control the flow of pneumatic fluid therethrough.

7. A pneumatic system as defined in claim **6** wherein said pressure regulating means further comprises an outlet port coupled to said auxiliary output, said outlet port being located remote from said selectively biased flow control means.

8. A pneumatic system as defined in claim **5** wherein said pressure regulating means is further selectively coupled to said main cylinder means to further selectively bias said flow control means.

9. A pneumatic system as defined in claim **1** wherein the terminating end of said first piston means shank portion is arranged to selectively abut said second piston means head portion to assist the movement of said second piston means in its travel from its said retracted position to its said extended position.

10. A pneumatic system as defined in claim **1** wherein the diameter of said first piston means head portion is generally equal to the diameter of said second piston means head portion.

11. A pneumatic system as defined in claim **1** wherein said divider means aperture comprises an axial bore arranged to provide bearing means for said first piston means shank portion.

12. A pneumatic system as defined in claim **11** wherein said axial bore includes seal means arranged to provide a sealed sliding fit between the outer surface of said first piston means shank portion and said divider means axial bore.

13. A pneumatic system as defined in claim **1** wherein said first piston means has at least one orifice extending selectively between said passageway and the outer surface of said first piston means shank portion to selectively divert at least a portion of the pneumatic fluid passing through said passageway.

14. A pneumatic system as defined in claim **13** wherein said orifice comprises a grooved portion located at the terminating end of said first piston means shank portion.

15. A pneumatic system as defined in claim **13** wherein said orifice comprises a generally radially extending bore disposed selectively rearwardly of the terminating end of said first piston means shank portion.

16. A pneumatic system as defined in claim **1** wherein said valve means comprises a generally elongate inner chamber, said valve means further including plunger means axially slidable in said inner chamber and having diverter means operable by said plunger means for selectively directing pneumatic fluid passing through said valve means inner chamber.

17. A pneumatic system as defined in claim **16** wherein said first piston means has at least one orifice extending selectively between said passageway and the outer surface of said first piston means shank portion to selectively divert at least a portion of the pneumatic fluid passing through said passageway.

18. A pneumatic system as defined in claim **17** wherein said orifice comprises a grooved portion located at the terminating end of said first piston means shank portion.

19. A pneumatic system as defined in claim **13** wherein said orifice comprises a generally radially extending bore disposed selectively rearwardly of the terminating end of said first piston means shank portion.

20. A pneumatic system as defined in claim **13** further comprising pressure regulating means coupled between said pneumatic pressure source and said auxiliary output for further selectively pressurizing said auxiliary output.

21. A pneumatic system as defined in claim **20** wherein said pressure regulating means comprises a housing having an inlet coupled to pressure source, the interior of said housing including means selectively biased towards said inlet port to control the flow of pneumatic fluid therethrough.

22. A pneumatic system as defined in claim **21** wherein said pressure regulating means further comprises an outlet port coupled to said auxiliary output, said outlet port being located remote from said selectively biased flow control means.

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