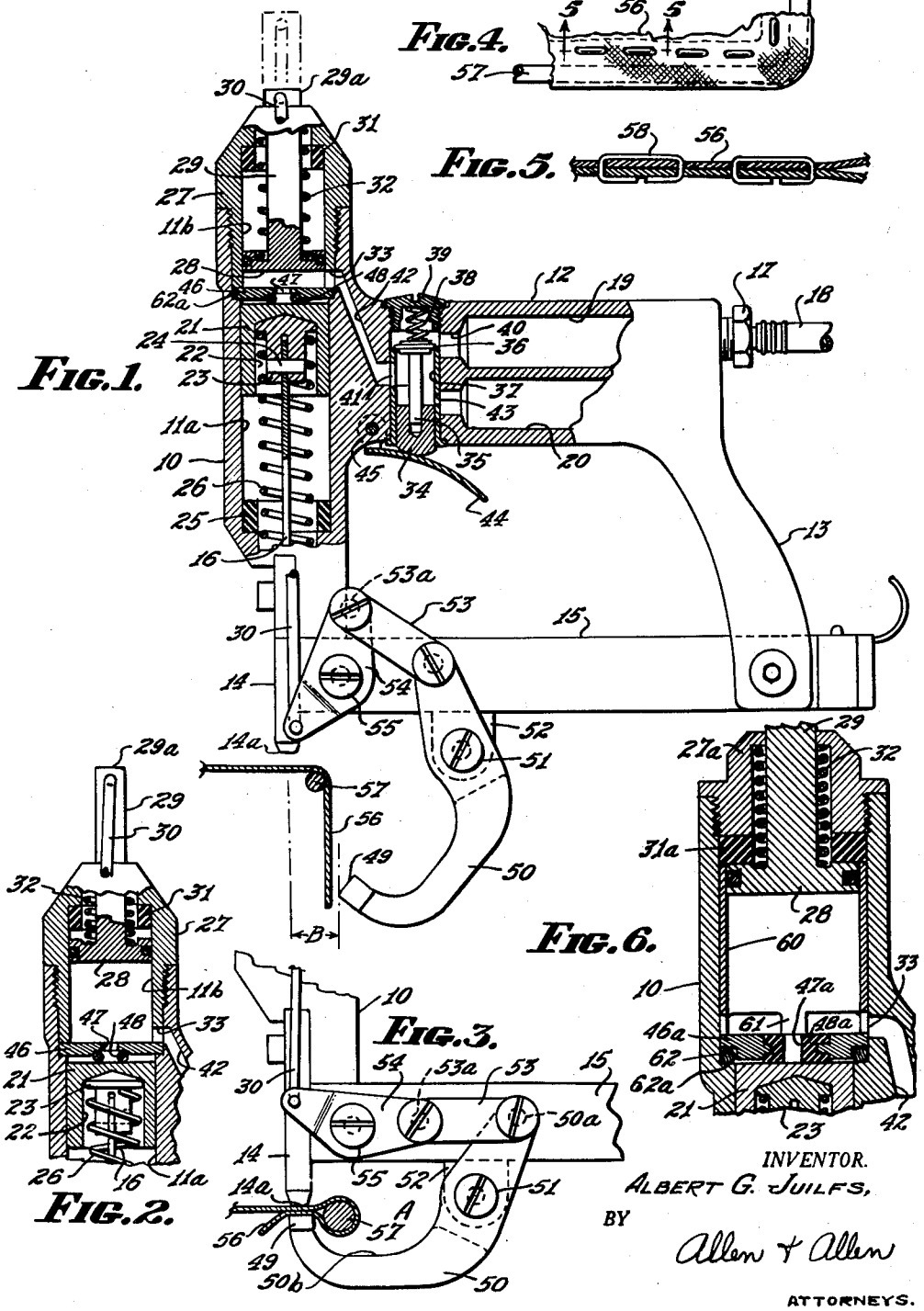
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STAPLING PLIER

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STAPLING PLIER

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My invention resides in a novel stapling plier which not only folds the work to be stapled about a member to which such work is to be attached but which also will hold the work while a staple is driven and clinched therein.

In my Patent No. 2,687,522, which issued August 31, 1954, there is disclosed a stapling machine which employs an anvil movable to and from the nose of the machine or gun. This anvil is normally pivoted to the staple feed magazine at a point relatively remote from the nose of the gun. Movement of the work end of the anvil towards the nose is in a relatively straight line and the distance moved is relatively short. Although the stapling machine of the aforementioned patent has proved quite satisfactory for a number of operations there are some jobs for which it is simply not suited.

A stapling tool such as shown in my aforementioned patent does not lend itself readily to the stapling of coarse bulky material such as foam rubber, cotton batting, rubberized hair, sisal and the like, particularly when speed is desired. One may not hold the nose of such a tool over the work and move it laterally of the work in order to drive a succession of staples in a continuous manner because the anvil is substantially directly beneath the nose of the tool and will engage the bulky material which hangs from the member about which it is being stapled. With such a tool it is therefore necessary to back the tool from the work and replace it for the driving of each staple or to use one hand to hold the material in place; this takes time and extra effort.

It is a very important object of my invention to provide a single anvil for a stapling plier which has a swinging movement in a definite, arcuate path towards that part of the plier through which the staple is driven into the work so that flexible work material may be wrapped around a member with which it is associated and stapled in position without the operator having to so move this material by hand.

It is a further and important object of my invention to provide an anvil arrangement which will insure positive location of the anvil after the work material has been wrapped into position and during the driving and setting of a staple in such material.

Another important object of my invention is to provide novel mechanism for the anvil control which includes a unique valve system in combination with certain link mechanism whereby the proper order of movement is obtained and the positive anvil control is insured.

More particularly it is an object of my invention to provide a stapling plier which will enable work which is presently accomplished by a hog ring and hog ringing tool to be done by staples and stapling. Presently in the fastening of bulky material such as sisal and foam rubber to springs on seats of automobiles, furniture and upholstery work in general, it is the practice for one to fold the material about the spring by hand and then move a hog ring into position and set same. This hog ring will hold the material about the spring member but it will also

present a wear problem in that the covering material will engage the exposed metal hog ring, particularly about the corners and other places where the material is bent at right angles to itself. A series of these hog rings along the front edge of a seat will, in addition to the problem of wear just mentioned, cause undesirable depressions in the seat edge. Such problems are now attacked by placing an extra strip of padding over the hog rings beneath the cover material; this is expensive. With my tool as herein disclosed staples may be set along a line back from and parallel to the edge of the seat, for example, with the result that the cover material when folded over this edge will not strike any metal and will not wear through—no extra protective strip is needed.

A further advantage of my invention is that the staple discharge end of the plier may be placed over the work to be stapled while at the same time the anvil itself is not engaged by the bulky material hanging from the work. As will be described further this is accomplished by reason of the fact that the anvil at rest does not lie beneath the nose of the tool. This permits the tool to be moved along a line parallel to the edge of the work and a succession of staples set in the work without the tool having to be backed from the work and replaced for each setting of a staple.

These and other objects of my invention will become apparent to those skilled in the art during the course of the following description and from reference to the accompanying drawings in which drawings like numerals are employed to designate like parts and in which:

Figure 1 is a side elevation, with parts in section, of a stapling plier embodying the features of my invention,

Figure 2 is a fragmentary section of a portion of the stapling plier and showing certain of the parts in position shortly after the plier has been initially actuated,

Figure 3 is a fragmentary side elevation showing the position of the anvil after it has been moved into position for the driving and clinching of a staple,

Figure 4 is a fragmentary perspective view showing the work which has been wrapped and stapled by the plier of this invention,

Figure 5 is an enlarged section on the line **5—5** of Figure 4, and

Figure 6 is an enlarged fragmentary section showing an alternative construction.

Certain of the mechanism employed in my stapling plier is now well known in the art and clearly shown in some of my issued patents such as that aforementioned and also my Patent No. 2,671,214, entitled Staple Drive Mechanism for Portable Pneumatic Staplers. The plier of the instant invention comprises a main casting or body section **10** which includes a cylinder **11***a*, a handle **12** and a brace **13**. Nose mechanism through which a staple is driven from the plier is generally indicated at **14**. There is a magazine **15** extending between the nose and the brace **13**. The magazine **15** may be of any conventional type for supplying a succession of staples into position within the nose **14** whereby to be contacted by a driver **16** and discharged from the plier into the work. Such a magazine may be like that shown in my Patent No. Re. 23,756, entitled, Staple Feed Mechanism for Portable Pneumatic Staplers, or like that shown in my Patent No. 2,781,515, entitled Improved Staple Feed Magazine. The magazine itself, however, does not constitute a specific limitation of this invention.

The plier of this invention also includes a connection **17** by which a hose **18** may be fastened for the supply of air to the chamber **19** within the handle **12**. The handle **12** also has an exhaust chamber **20** located therein.

Located within the cylinder portion **11***a* is a skirted piston **21** the bore **22** of which slidably receives a coupler member **23** to which is pinned the driver **16** as indicated

at 24. Within the lower end of the cylinder portion 11*a* is a resilient pad 25. Also located within the cylinder portion 11*a* is a return spring 26 which abuts the member 23 at one end, this end also being received within the bore 22 of the piston 21, and abuts a suitable portion (not shown) of the casting 10 at its other end. When the piston 21 is driven by air as will be described shortly and abuts the stop pad 25, the driver 16 and coupler member 23 are free to advance due to their momentum. This arrangement is clearly shown in aforementioned Patent No. 2,671,214 and does not form a specific limitation of the instant invention.

In my Patent No. 2,682,052, entitled Plunger and Staple Driving Structure for Pneumatic Stapling Machines, there is disclosed a structure by which the driver may be fixed to the piston. It is entirely possible that such a fixed driver arrangement would also be desirable in the stapling plier of the instant invention and it is to be understood that the plier of this invention is not limited in this respect; it may be as shown in Patent No. 2,671,214 or Patent No. 2,682,052 or perhaps even in some other way. As stated the driver-piston arrangement does not constitute a specific limitation of this invention except insofar as it is specifically set forth in the subjoined claims.

In Figures 1 and 2 I have shown the casting 10 as being threaded to receive an upper member 27 which has a cylinder portion 11*b* therein. Slidable within such cylinder portion 11*b* is a piston 28 to which there is affixed a piston rod 29. This rod 29 is slidable within an orifice provided in the upper end of the member 27 and projects therefrom as indicated at 29*a*. Fastened to the end 29*a* of the rod 29 beyond the outer end of the member 27 is a connecting member 30 which will be described in greater detail shortly. Within the upper end of the cylinder portion 11*b* is a stop pad 31. There is also a spring 32 within the cylinder portion 11*b* and this spring engages the piston 28 and a portion (not shown) of the member 27.

The spring 32 urges the piston 28 away from the pad 31. The extent of downward movement of the piston 28 is governed by contact of the member 30 with the upper end of the member 27. As shown in my aforementioned Patent 2,687,522, however, this may be regulated by placing other members between the upper end of the member 27 and the connecting member 30. In any event it is desirable that the lower end of the piston 28 at rest be adjacent the inlet port 33 located in the member 27.

Referring now to Figure 6 I have shown another arrangement which has proved very satisfactory. In this arrangement the casting 10 is elongated and the member 27*a* shortened. The upper region of the elongated casting 10 defines a cylinder area corresponding to the cylinder 11*b* of Figure 1. In this area there is, however, located a sleeve 60 which functions as the upper cylinder. This sleeve 60 terminates in a plurality of legs 61 which engage the upper surface of the member 46*a*. This member 46*a* has a flange which engages a resilient seal 62 on the shoulder 62*a* formed within the casting 10 to receive the seal 62 and partition member 46*a*. In this partition member 46*a* is located a valve seat 48*a*.

It will be understood that the width of the legs 61 of the sleeve 60 is not sufficient to obstruct air from entering the tool through the port 33.

In the arrangement of Figure 6 the resilient pad 31*a*, which corresponds to the pad 31 of Figure 1, also engages the top of the sleeve 60. When the member 27*a* is screwed into position in the top of the casting 10 the arrangement is such that this member 27*a* will engage the pad 31*a* and force it firmly against the upper end of the sleeve 60 with the result that this sleeve is forced against the member 46*a* whereby this latter member is securely pressed in position within the casting 10 against the seal 62 on the shoulder 62*a* provided for it. This

arrangement provides a good upper cylinder while at the same time eliminating certain close tolerances which have to be observed in manufacturing the arrangement of Figure 1. In Figure 6 it will also be observed that I have shown the piston 28 and rod 29 as having reached its upward limit wherein the piston 28 engages the stop pad 31*a*. The piston 21, however, has not left engagement with the valve seat 48*a* although it will be understood that this is just about to happen. This merely emphasizes the point that it is desired that the upper piston substantially completes its movement before the lower piston is actuated.

As is explained in greater detail in the passages to follow air which enters the casting 10 through the port 33 will fill the region below the piston 28 and above the partition member 46*a*. The only air to make initial contact with the piston 21 is that which passes through the valve seat 48*a* which defines a very small exposed piston area. The amount of piston area 28 exposed to this air is so much greater than that permitted by the valve seat 48*a* that the piston 28 will be moved first. When this piston 28 substantially completes its movement and the pressure of the air within the cylinder defined by the sleeve 60 builds up sufficiently the piston 21 will move out of contact with the valve seat 48*a* and this piston then immediately be driven hard and fast for upon such movement its entire upper surface will be exposed to the full pressure of the air.

Located within the handle 12 is a valve arrangement including the slidable member 34, valve stem 35 and valve seat 36. The seat 36 normally engages the upper end of a sleeve 37 against which it is urged by spring 38 located between the seat 36 and a cap 39 screwed into the handle 12. There is a port 40 which communicates with the chamber 19 and valve area adjacent the upper end of sleeve 37. Similarly there is a port 41 which communicates with the passageway 42 leading to the port 33. There is an exhaust port 43 which communicates with the chamber 20.

The valve may be actuated by means of a trigger 44 pivoted to the handle as indicated at 45. When the trigger 44 is actuated the member 34 will block the exhaust port 43. Upon further movement of the member 34 the valve stem will be engaged and the seat 36 moved from the sleeve 37 whereby air may enter via the hose 18, chamber 19, ports 40 and 41 and passageway 42 to the port 33. When the seat 36 returns to its position against the upper end of the sleeve 37 air may exhaust from the port 33, through the passageway 42, through the ports 41 and 43 to the chamber 20.

The basic mechanism so far described, with the exception of the sleeve arrangement shown in Figure 6 and the valve mechanism 48*a* briefly mentioned, is now well known in the art and does not constitute a specific limitation on the instant invention except insofar as any of this mechanism has a definite association with the novel mechanism now to be described and which association will be made clear as the description continues.

Within the casting 10 (see Figure 1) in the region of the meeting of the cylinder portions 11*a* and 11*b* I have provided a disc 46 having a small orifice 47 therein, which orifice is surrounded by a valve seat 48 which is fixed to the member 46. I have shown the disc 46 as seated on a shoulder 62*a* formed in the casting 10 and held in position by the member 27. It is to be understood, however, that this showing is exemplary only and that any sort of abutment providing the orifice 47 and valve seat 48 will suffice. Also, although I have shown the cylinder as made up of a portion 11*a* and a portion 11*b* it is to be understood that a single cylinder might be utilized although certain difficulties would be encountered. Furthermore, in the arrangement of Figure 6 the disc 46*a* seats on a resilient seal 62 which rests on the shoulder 62*a* formed in the casting 10. In this arrangement the member 46*a* is held in position by the sleeve

60 which is in turn engaged by the pad 31*a* which is in its turn compressed by the member 27*a*.

The valve seat 48 and 48*a* must have an air tight engagement with the piston 21 which abuts it. This may be accomplished by using metal and grinding and polishing it to a fine degree. It may also be accomplished by using a resilient material.

It is important that there be some space between the upper side of the member 46 and the lower side of the piston 28 and it is important that this space communicate with the port 33 through which air will be admitted by manipulation of the valve structure earlier described. In this connection it should again be emphasized that the legs 61 on the member 60 are not of sufficient width to block this port 33 even should the sleeve 60 by chance be so positioned in the casting 10 that one of such legs would lie adjacent this port. The spring 26 will normally urge the piston 21 into contact with the resilient grommet or valve seat 48 which for purposes of illustration only I have indicated as being made of rubber. As noted earlier this can be a metal to metal contact or any arrangement giving an air tight seal between the two members 46 (46*a*) and 21 around the orifice 47 (47*a*). It is important that the only air which has initial contact with the piston 21 is that which comes through the orifice 47 or 47*a* as the case may be. It is also important that the diameter of the orifice 47 (or 47*a*) is relatively quite small as compared to the diameter of the piston 28 so that the area of the piston 21 which comes into initial contact with air from the port 33 is much smaller than the area of the piston 28 contacted by this same air.

The anvil 49 is mounted on the end of an arm 50 which is pivoted intermediate its ends on a pin 51 in a lug 52 extending from the magazine 15. At its other end the anvil arm 50 is pivotally connected to a link 53 which is in turn pivotally connected to a link 54 which is pivoted to the magazine section 15 as indicated at 55. The lower end of the connecting member 30 is fastened to the link 54. Although I have shown the anvil arm 50 as pivoted to a lug 52 extending from the magazine section 15 it will be understood that such connection might be directly on the magazine section or on some other suitable member. This is also true of the link 54. A specific location of the pivot points 55 and 51 is not important except insofar as they are a part of the unique features now to be pointed out more particularly.

It is preferred that the member 50 be shaped along the general lines indicated in Figures 1 and 3 so that there will be a very much enlarged throat defined by this member and the magazine 15 when the anvil has been brought into operative position beneath the nose 14*a*. This is necessary since much of the material for which this tool has been designed will be much bulkier than that shown by way of illustration and indicated at 56. In order for the anvil 49 to be brought close enough to the nose 14*a* to insure the proper setting and clinching of a staple there must be room for this bulky material so that it will not engage between the member 50 and the magazine 15 and prevent proper closing or position of the anvil 49. Thus I have shown the member 50 as having a recessed area 50*b* between the anvil 49 and pivot point 51. This recess 50*b*, plus extension of the nose 14*a* beyond the bottom of the feed magazine 15 products a large throat area A even when the anvil 49 is adjacent the nose 14*a* and in which the bulky material 56 gathered about the member 57 may accumulate without hindering operation of the tool of this invention.

The air which initially enters the space between the piston 28 and member 46 will contact all the area of the lower side of the piston 28 but only a very small area of the piston 21 as governed by the orifices 47 and 47*a* and valve seat 48 or 48*a*. This fact, coupled with the fact that the spring 26 will normally be stronger than the spring 32, insures that the piston 28 will move against its spring 32 towards the seat 31 prior to the time that there is any movement of the piston 21. The area of the lower piston exposed through the valve seat 48 or 48*a* should be sufficient only to permit initial pressure on such piston to be approximately equal to but less than that furnished by the spring 26. When the upper piston stops air pressure will build up beneath the upper piston towards line pressure and this increased pressure will overcome spring 26 whereupon the piston 21 will be moved. As the pivot point 53*a* approaches its final position, which position is substantially that shown in Figure 3, and as the piston 28 approaches the pad 31, the pressure acting on the piston 21 in the region of the orifice 47 will build up to such an extent that this piston will finally be moved out of contact with the valve seat 48. As soon as there is the slightest movement of the piston 21 from the valve seat 48 or 48*a*, which does not occur until the upper piston has substantially completed its upward movement, the air will then be in contact with the whole upper surface of the piston 21 whereupon it will be driven hard and fast towards its stop 25. This latter movement of the piston 21 and its driver 16 will, of course, result in the driver 16 contacting a staple within the nose 14 and driving same through the work. Prior to this the upper piston 28 will have completed its movement toward the pad 31 and the links 53 and 54 will have come to the position of Figure 3 whereby the material is compressed.

By the linkage arrangement shown and described it will be clear that movement of the anvil towards the nose 14*a* is fastest at the start of the clinching operation. This speed of anvil closing decreases as it approaches the nose 14*a*. The power or force with which the anvil moves is greatest as it reaches the nose which is desirable for it is at that point that the material is being compressed and such force is needed. It is not necessary for the piston 28 to seat against the pad 31 or for the pivot point 53*a* to reach the position shown in Figure 3 in order to obtain good locking of the anvil and good staple clinching. Thicker materials will result in the piston 28 not seating and the point 53*a* stopping short of that shown in Figure 3. The anvil 49 is wide enough to permit some small variation of this kind. For very thick materials, however, it may be necessary to shorten the length of the link 53. The anvil linkage arrangement in combination with the valve arrangement 48—48*a* insures that a small initial movement of the upper piston will produce a relatively large initial movement (and speed) of the anvil, a large final movement of the upper piston producing a relatively small final movement (but with increased power) of the anvil, all of this substantially completing prior to the time the staple is driven, set and clinched. It is important that the anvil 49 substantially completes its movement before the staple is discharged from the nose 14*a* otherwise the staple would be very apt to miss the anvil. As will be explained in greater detail shortly this anvil is moving in a definite arcuate path towards the nose 14*a* and the cloth which it clinches against the nose would more than likely push the staple legs out of the way should the staple be driven prior to substantial closing of the anvil.

Initial position of the anvil 49 with respect to the discharge end 14*a* of the plier nose is very important. As seen in Figure 1 not only is the anvil 49 relatively far removed from the nose 14*a*, considered in a downward direction, but also it is moved back from the nose 14*a* towards that end of the magazine to which the handle 13 is attached. Thus, in moving towards the nose end 14*a* the anvil 49 must move both upwardly and forwardly. It is this movement which enables the anvil 49 to wrap the flexible work material 56 about the member 57. No other plier known to me will do this.

In Figure 1 the anvil 49 is shown in its at rest position.

In this figure I have drawn vertical lines parallel one to the other, one extending from the nose **14***a* and the other through the anvil **49**. The distance between these lines is indicated at B. This distance is relatively substantial and extremely important. It is this relationship of anvil to nose which permits the nose to be held in place, as indicated in Figure 1, and then moved laterally or along a line parallel to the member **57** about which the material **56** is to be wrapped and secured. With the nose **14***a* in the position indicated the plier may be actuated with the result that the anvil **49** will gather the material **56** about the member **57**, thus coming to the position of Figure 3, whereafter a staple will be driven and clinched. Upon release of the trigger **44** the anvil arm **50** and anvil **49** will return to the position indicated in Figure 1. The plier may be then moved parallel to the member **57** a short distance and actuated again. This is a definite advantage inherent in the tool of this invention. In all stapling pliers presently known to me the tool must be backed away from the member **57**, rather than moved parallel to it, because the bulky material **56** would interfere with the anvil **49** which, in these other arrangements, would be substantially beneath the nose **14***a*, thus making such lateral movement impossible. In other pliers if one attempts to move the plier laterally it is necessary to hold the material by hand close to the plier which is not only difficult but which sometimes results in staples being driven into fingers.

In my arrangement the anvil is out of contact with this material until actuated even though the nose is over the spot where the staple will be set—and one does not have to use his free hand to fold and hold the material.

The mechanism **50**, **53** and **54** in combination with the valve arrangement **46**—**48** insures not only that the anvil **49** will be moved towards the nose **14***a* so as to wrap the work **56** about the member **57** but also so that the anvil will hold this work between it and the nose with considerable force. This makes it unnecessary for an operator to use his hands to wrap the material **56** about the work **57** and hold it while a staple is driven. This is a very important feature of this invention. With the anvil **49** maintaining the work **56** between it and the nose **14***a* final driving of the staple is then accomplished. This anvil gives a good support for the driving and clinching of such staple and will not be pulled away from the work.

When the trigger **44** is released and the valve **34** opened to exhaust both pistons will return to their initial position under the influence of their springs **26** and **32**. In connection with the piston **28** and its stop pad **31** or **31***a* it should again be pointed out that there may be some instances, for example when the material **56** is unusually heavy, wherein such piston **28** will not actually seat against this pad although it must be understood that the anvil **49** will be close enough to the nose **14***a* that it will be properly engaged by the legs of the staple as they are driven through the work. And the linkage will be near enough to a straight line position to give considerable holding power.

The valve arrangement **48** and link mechanism **53**—**54** are important not only in that they account for an initial fast movement of the anvil **49** towards the nose **14***a* upon preparation for driving and clinching a staple through the work **56** about the member **57**, but also because such mechanism results in a slower movement of the anvil **49** as it approaches close to the nose end **14***a*. This is important for otherwise the momentum of the initially fast moving anvil **49** might be sufficient to tear the material **56** and perhaps even to damage the stapling plier itself.

Location of the anvil **49** and arm **50** so as to produce the swinging jaw arrangement is a very important feature of this invention. Referring to my Patent 2,687,522 it will be seen that the instant arrangement is quite different from that there shown. In the arrangement of my patent the anvil is located directly beneath the nose and moves theretowards in a line which is substantially a straight line in the vertical plane containing the driver and which is relatively short. Such movement is steady instead of fast and then slow. In the instant arrangement the anvil **49** moves through an arcuate path which includes, in effect, movement along two lines, namely, the vertical and the horizontal. This swinging movement of the anvil **49** will wrap the material as earlier described. A staple may then be set as indicated at **58** in Figure 4.

It is believed that the description of the invention has been set forth in sufficient detail and that a further description of the operation thereof is therefore unnecessary.

It is to be understood that although I have shown my invention as embodied in certain particular structures and arrangements, I do not intend to be limited to such structures and arrangements except insofar as they are specifically set forth in the subjoined claims.

It is to be understood also that changes and modifications may be made in this invention without departing from the scope and spirit thereof.

Having thus described by invention, what I claim as new and what I desire to protect by United States Letters Patent is:

1. In apparatus including a first cylinder, a first piston slidable in said first cylinder, a second cylinder and a second piston slidable in said second cylinder, improved valve mechanism for controlling the order of movement of said pistons which comprises: a partition between said pistons, said partition having an orifice therethrough, a valve seat around said orifice, means to urge said first piston against said valve seat, and means to introduce air under pressure between said partition and said second piston, the diameter of said orifice being substantially smaller than the diameter of said second piston, whereby said second piston will move under influence of said air under pressure before said first piston is moved by said air.

2. In a stapling machine comprising a housing, a handle, a staple discharge nose, said nose defining a drive track, a flat driver slidable in said track, a first cylinder in said housing, a first piston slidable in said first cylinder to move said driver in said track, means to position a succession of staples in said track for driving contact by said driver, an anvil, a second cylinder in said housing, a second piston slidable in said second cylinder, means connecting said second piston to said anvil, valve means to admit air under pressure to said cylinders whereby to move said pistons, and means to return said pistons after so driven, said staple positioning means comprising an elongated channel member abutting said nose and located at right angles to the vertical plane passing through the plane of said flat driver, said handle connecting said housing and the end of said channel member removed from said nose, the improvement which comprises: a partition between said cylinders, an orifice in said partition, a valve seat surrounding said orifice and adapted to be engaged by said first piston whereby to seal said first cylinder from air entering said orifice, means to maintain said piston out of contact with said partition, said valve means including an air inlet port between said partition and said second piston, the diameter of said orifice being considerably smaller than the diameter of said second piston, whereby said second piston will move prior to said first piston until the pressure between the pistons via said orifice builds up sufficient to move said first piston from said valve seat whereafter said first piston will be moved hard and fast.

3. In a stapling machine comprising a body having a staple discharge nose, a driver, a first piston slidable to actuate said driver, an anvil, a second piston slidable to actuate said anvil, means to introduce air to said pistons whereby to actuate them, means to return said pistons, and feed means for positioning a staple to be driven by said driver, the improvement which comprises: valve means to permit said air to make initial contact with said pistons substantially simultaneously, the area of said first

piston so contacted being considerably smaller than that of said second piston so contacted, whereby said second piston moves a substantial distance before said first piston moves.

4. In a stapling machine comprising a body having a staple discharge nose, a driver, a first piston slidable to actuate said driver, an anvil, a second piston slidable to actuate said anvil, means to introduce air to said pistons whereby to actuate them, means to return said pistons, and feed means for positioning a staple to be driven by said driver, the improvement which comprises: valve means to permit said air to make initial contact with said pistons substantially simultaneously, the area of said first piston so contacted being considerably smaller than that of said second piston so contacted, whereby said second piston moves a substantial distance before said first piston moves; and including a wall between said pistons, said valve means comprising a port in said wall, a valve seat surrounding said port and abutted by said first piston whereby to define said small area of initial air contact, and an air inlet port located between said wall and said second piston.

5. In apparatus including a first cylinder, a first piston slidable in said first cylinder, a second cylinder and a second piston slidable in said second cylinder, improved mechanism for controlling the order of movement of said pistons which comprises: a partition fixed within the cylinder portion of said apparatus between said pistons, each of said pistons being movable to and from said partition, said partition having an orifice therethrough, a valve seat around said orifice, means to urge said first piston against said valve seat, and means to introduce air under pressure between said partition and said second piston, the diameter of said orifice being substantially smaller than the diameter of said second piston, whereby said second piston will move under influence of said air under pressure before said first piston is moved by said air.

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