US 20030197046A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2003/0197046 A1

Steed (43) Pub. Date: Oct. 23, 2003

(54) STAPLER WITH FEED SYSTEM FOR ELEMENTS TO BE STAPLED TO A WORKPIECE

(76) Inventor: **William G. Steed**, New Westminster (CA)

Correspondence Address:
**ADE & COMPANY**
**1700-360 MAIN STREET**
**WINNIPEG, MB R3C3Z3 (CA)**

(21) Appl. No.: **10/292,804**

(22) Filed: **Nov. 13, 2002**

**Related U.S. Application Data**

(62) Division of application No. 09/553,765, filed on Apr. 21, 2000, now abandoned.

(30) **Foreign Application Priority Data**

Apr. 20, 2000 (CA) ..... 2,306,362

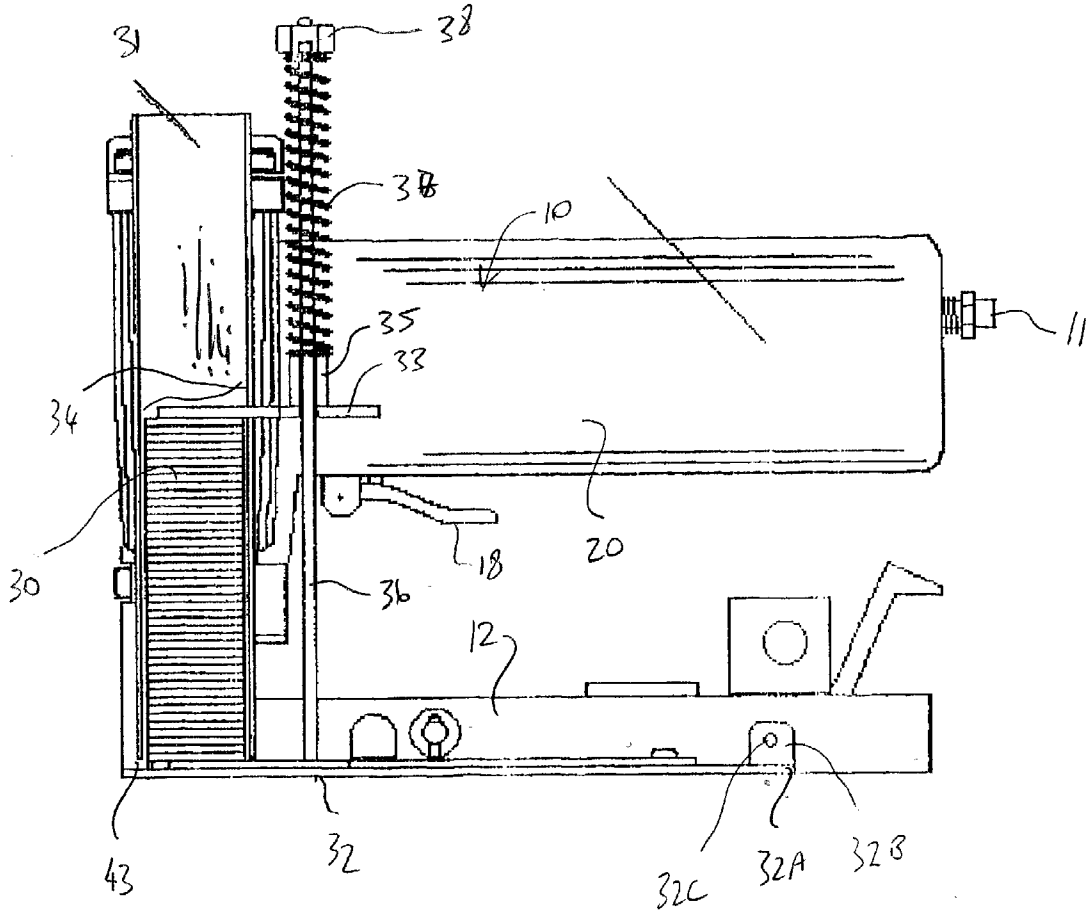
**Publication Classification**

(51) **Int. Cl.**[7] ..... **B21J 15/28**

(52) **U.S. Cl.** ..... **227/2**

(57) **ABSTRACT**

A stapler with a tab magazine includes a staple magazine parallel to a workpiece surface, a staple driving head and an electric drive for effecting a forwarding movement of the staple driver head. The driver head is controlled by a trigger and electric drive circuit. A tab magazine is provided along side the tab driver head for receiving a plurality of substantially planar separate tabs in a stack of the tabs arranged each on top of the next. A drive lever pivots in a plane parallel to the surface to move a tab at the forwardmost position to the stapling position such that the staple passes through the tab at the stapling position to fasten the tab to the workpiece. The lever is driven by an electric driver controlled by a timing circuit at a timed relation relative to the driving action of the previous tab. In another arrangement, the tab magazine is replaced by a roll of fiber reinforced tape so that a complete strip of tape underlies the staples and they all can be removed in a single pulling action. The strip or tabs act to locate a bag or wrapping on an article such as a stack of lumber.



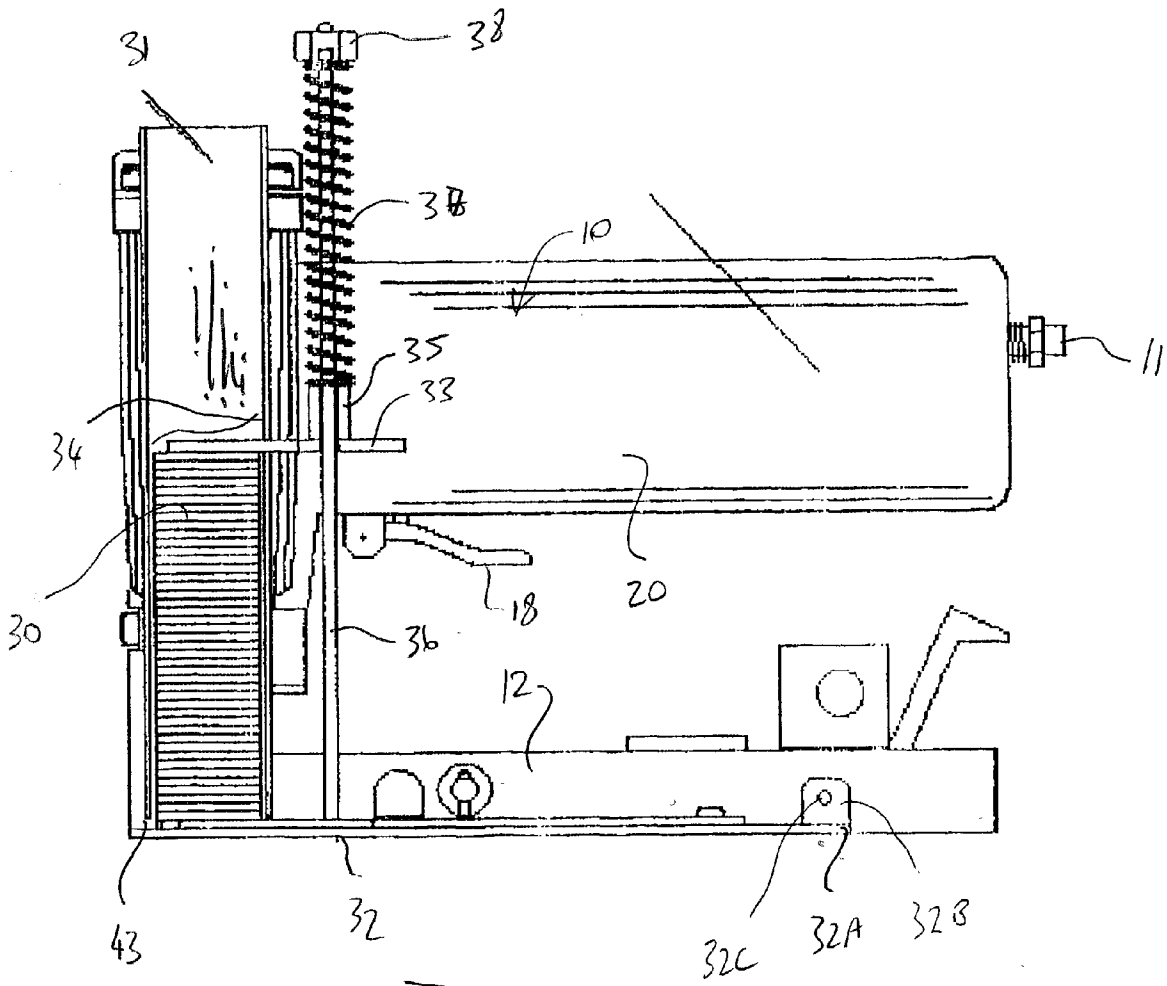



FIG. 1

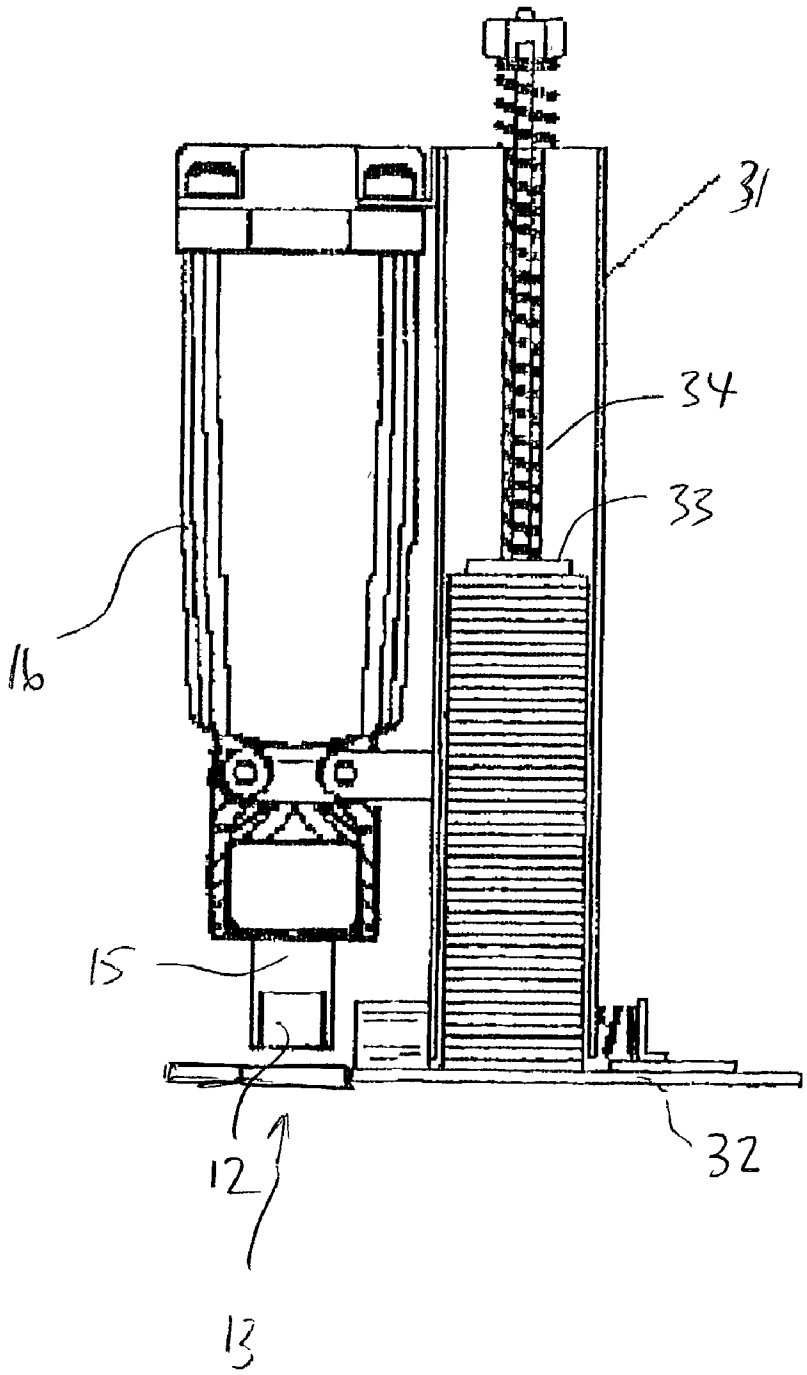



FIG. 2

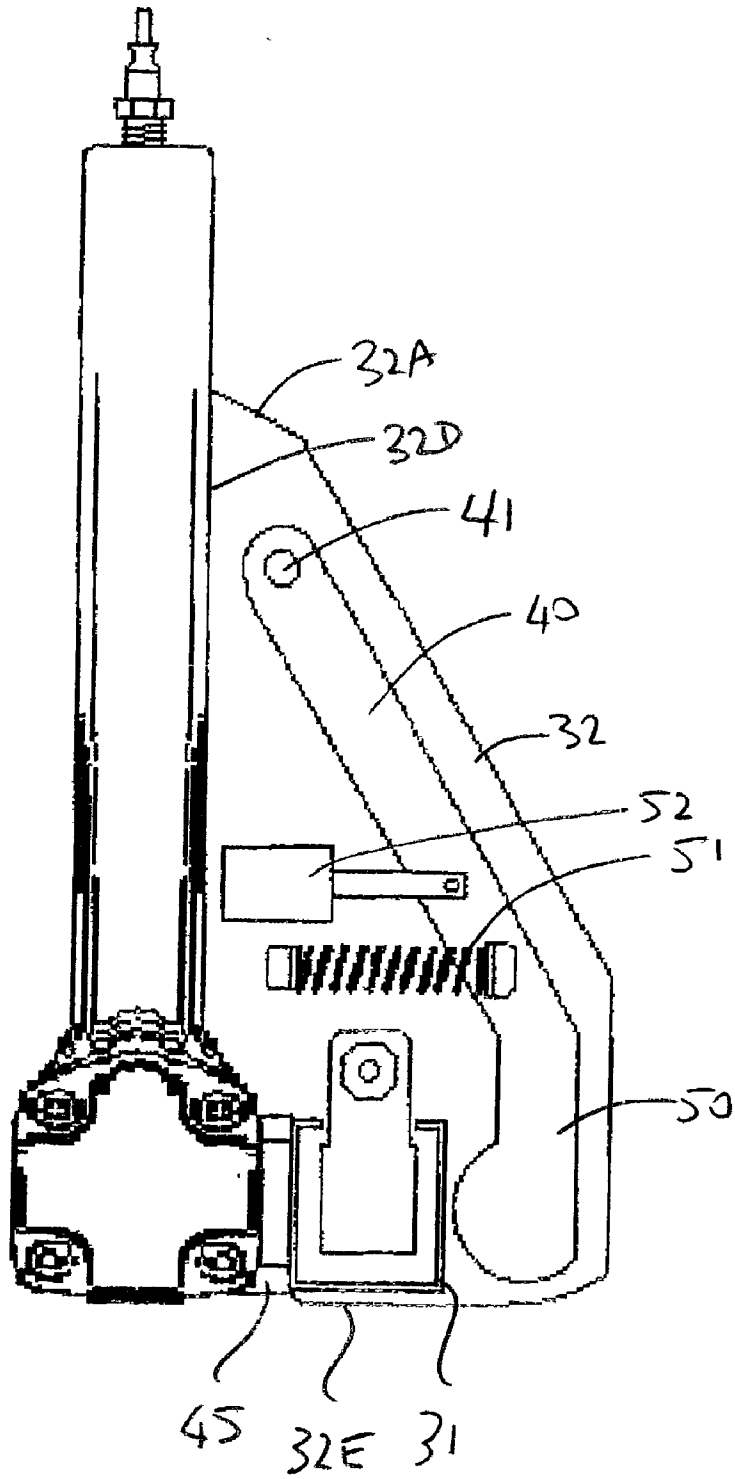



FIG. 3

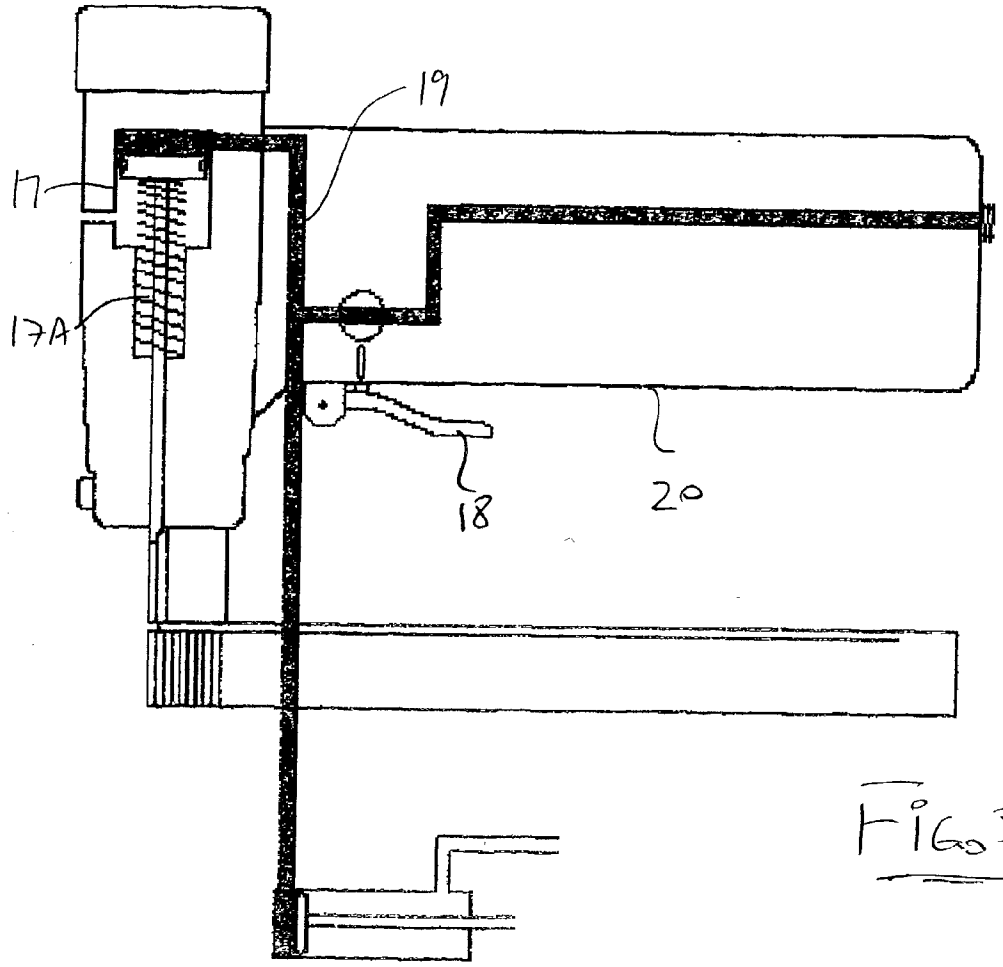



FIG. 5

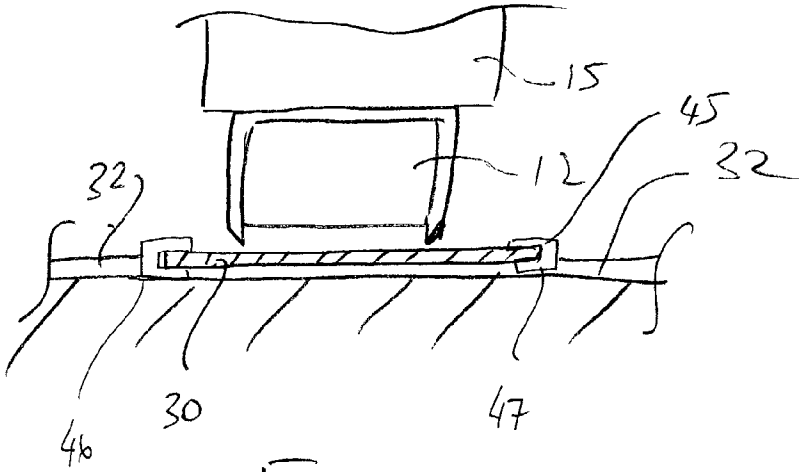



FIG. 4

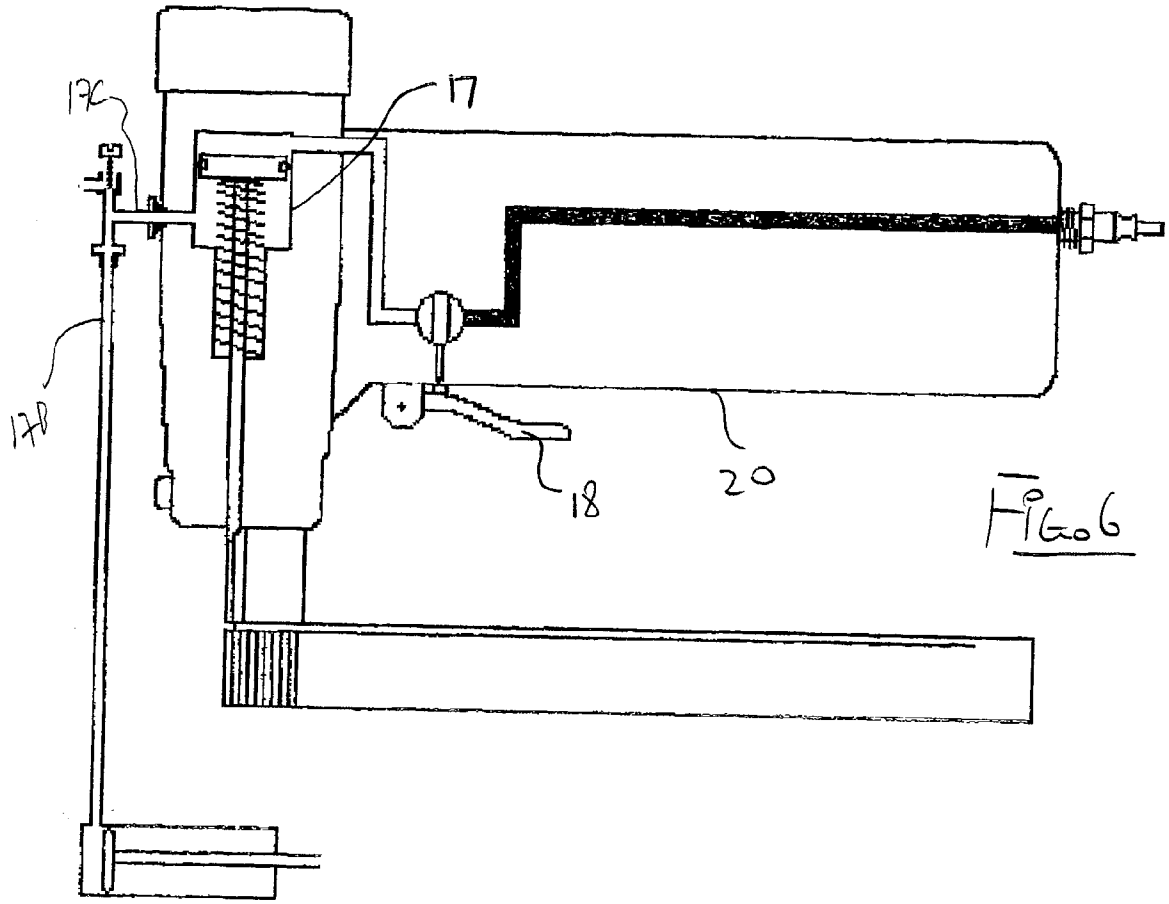



FIG. 6

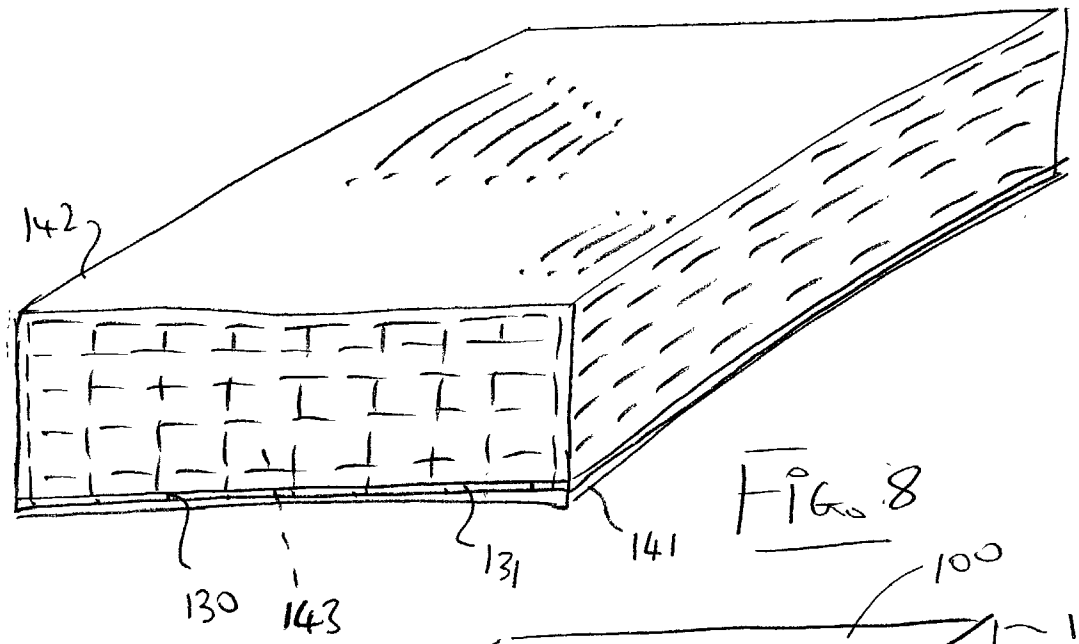



FIG. 8

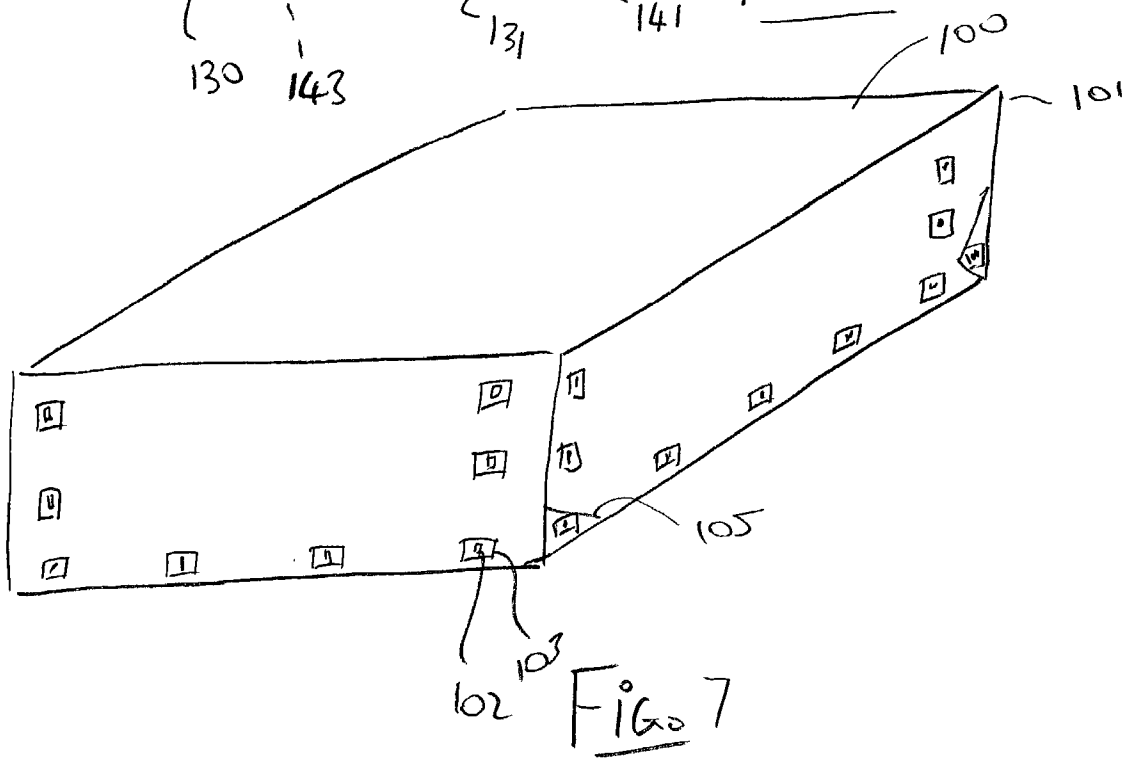



FIG. 7

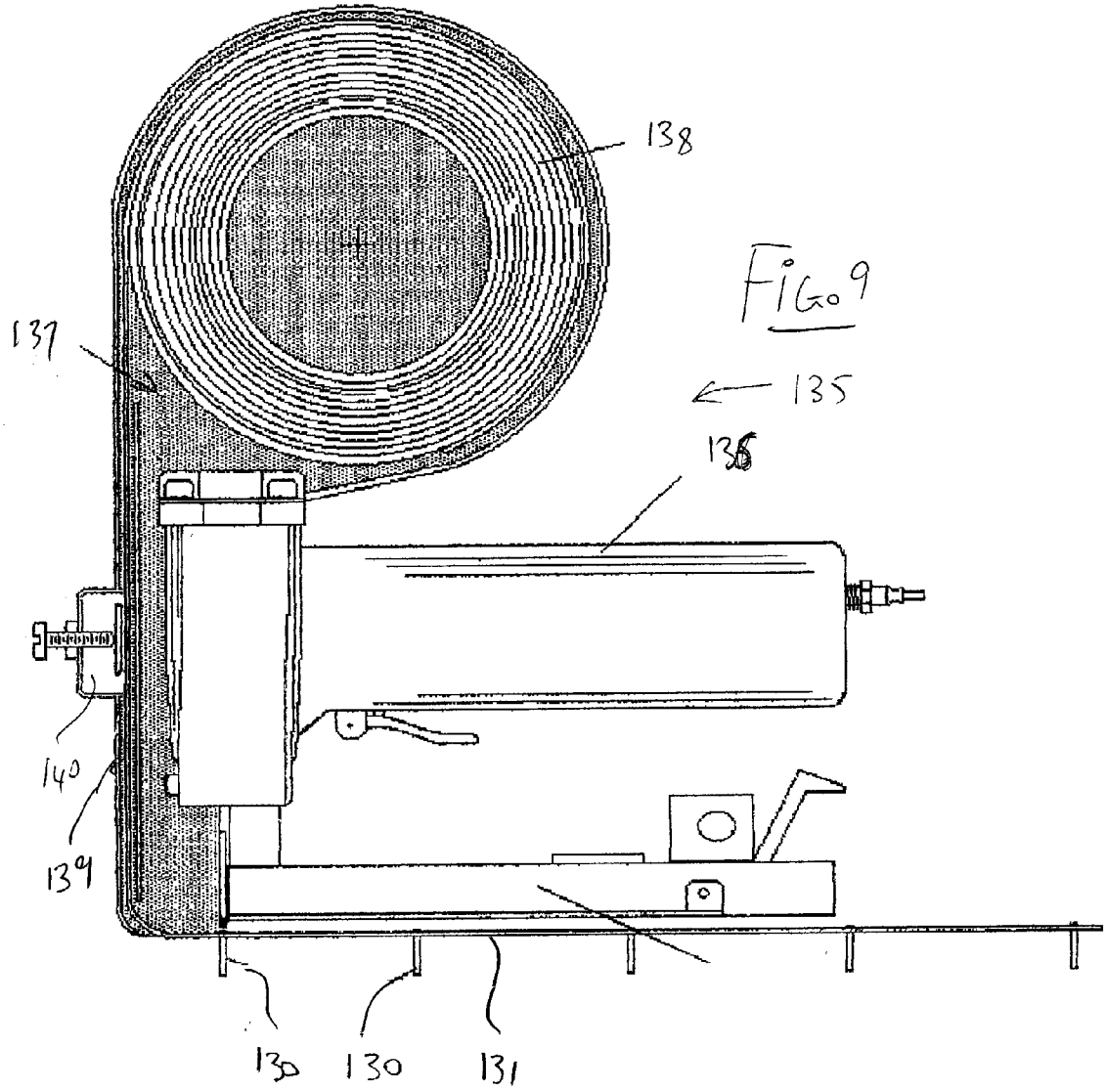



FIG. 9

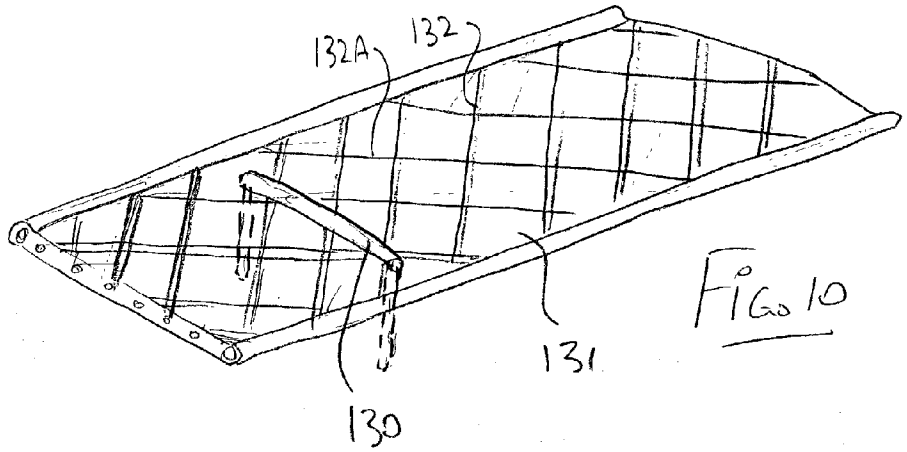



FIG. 10

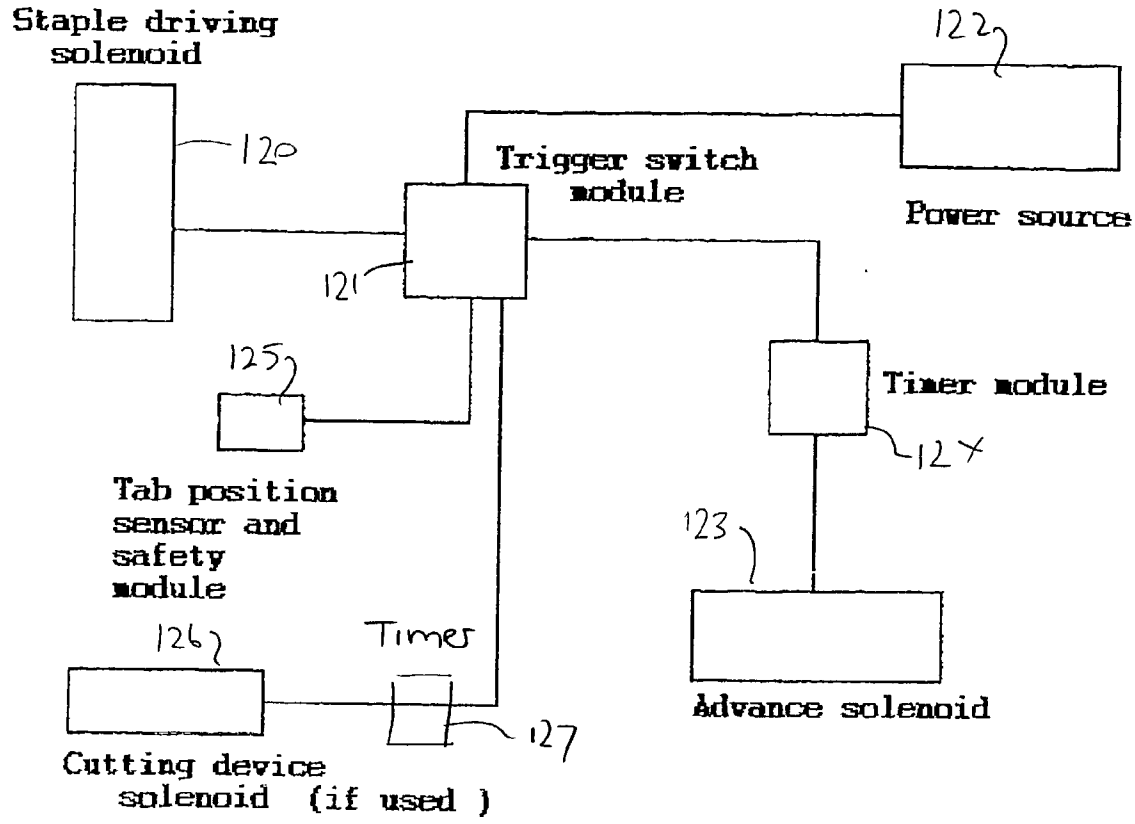

Staple driving solenoid
120
122
Trigger switch module
Power source
121
125
Timer module
124
Tab position sensor and safety module
123
126
Timer
127
Advance solenoid
Cutting device solenoid (if used )

Fig. 11

# STAPLER WITH FEED SYSTEM FOR ELEMENTS TO BE STAPLED TO A WORKPIECE

[0001] This application is a Divisional Application of application Ser. No. 09/553,765 filed Apr. 21, 2000 and now abandoned.

[0002] This invention relates to a stapler with a feed system for elements to a position underlying the stapler to be applied with the staple onto the workpiece.

[0003] The elements to be applied are generally in the form of flat elements which can be called tabs, tags or strips and can act as a label for providing information on the workpiece or a washer for preventing the staple from tearing through a sheet, for example a wrapping material, applied onto the workpiece.

[0004] The workpiece or article to which the staples and elements are applied can be of any suitable nature which can receive the staple including a single piece or a plurality of pieces such as a stack of lumber. The invention is particularly but not exclusively designed to allow wrapping of stacks of lumber by a sheet wrapping material for protection during transportation. However many other uses of the arrangements described herein are possible.

## BACKGROUND OF THE INVENTION

[0005] It is known from U.S. Pat. No. 3,385,498 (Downie) issued May 28, 1968, U.S. Pat. No. 5,014,896 (Reitmeier) issued May 14, 1991, U.S. Pat. No. 5,259,826 (Woods) issued Nov. 9, 1993 and U.S. Pat. No. 5,292,048 (Vanderwiel) issued Mar. 8, 1994 to provide a roll of elements in strip form where the roll is attached to a pneumatic stapler so that each stapling action includes forwarding movement of the strip so that a single one of the elements can be applied with each staple to the workpiece.

[0006] The above patents disclose various arrangements for forwarding the strip, mounting the strip and cutting the strip. Such elements in strip form are preferably relatively thin and thus comprise labels which are applied onto the work piece as a support for information defined on the label.

[0007] Woods discloses an arrangement for driving the strip using pneumatic supply from the pneumatic stapler.

[0008] Downie discloses the use of the individual flat elements to act as washers which act to reinforce wrapping material to prevent the staples from pulling through the wrapping material.

[0009] Plastic sheets are used to cover and protect finished lumber during storage and shipping. The current method involves wrapping the lumber in plastic which is held in place with staples and 'washers' made of plastic approximately 0.035 inches thick. These "washers" or 'tabs' are intended to reduce tearing around the staples and are provided in strips of 8 to 10. During application, they are held in place by the operator as he staples them to the lumber. This is a two handed operation and as it is also necessary to hold the wrap in place, is quite difficult. It would be an advantage to the industry to have a device which held and advanced the tabs automatically as each one was stapled, thereby freeing one of the operators hands to hold the wrap in place.

## SUMMARY OF THE INVENTION

[0010] It is one object of the present invention to provide a stapler with a tab feed.

[0011] An electrically powered tool would be more efficient than pneumatic units in that electrical power (line current) does not have to be converted to mechanical power (compressor motor) and then into compressed air for use in the staple gun. (An estimated 70% loss, 30% in the motor+ 40% in the compressor.)

[0012] It is a second object of the present invention to provide an improved stapler which has the advantage of using more efficient and more convenient electric power.

[0013] According to one aspect of the present invention there is provided a stapler comprising:

[0014] a staple gun having:

[0015] a staple magazine;

[0016] a staple driving head;

[0017] a drive assembly for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a workpiece surface to a stapling position on the workpiece surface such that a staple from the magazine is driven into the workpiece, the drive assembly including a first electric driver and a trigger for controlling actuation of the first electric driver such that each operation of the trigger effects one forwarding movement of the staple driver head;

[0018] a supply magazine for supplying a plurality of substantially planar flat elements one at a time to the stapling position such that the staple passes through the flat element at the stapling position to fasten the flat element to the workpiece;

[0019] and a reciprocating drive actuator for effecting movement of the flat elements to the stapling position, the drive actuator including a second electric driver;

[0020] and a timing circuit for controlling actuation of the second electric driver relative to actuation of the first electric driver such tat the flat element is located at the stapling position when the staple driver head is actuated.

[0021] Preferably the supply magazine comprises a sleeve member for receiving a plurality of substantially planar, separate tabs in a stack of the tabs arranged each on top of the next, the magazine being arranged to support the stack in a direction generally parallel to the movement of the driver head and at a position to one side of the driver head, a spring feeding the tabs forwardly of the magazine to a forwardmost position, a drive member for moving a tab at the forwardmost position to the stapling position such that the staple passes through the tab at the stapling position to fasten the tab to the workpiece and a reciprocating drive actuator for effecting movement of the drive member in a moving action from the forwardmost position to the stapling position and back to the forwardmost position for moving another tab, the drive actuator including the second electric driver.

[0022] Preferably the staple magazine is at right angles to the head so as to lie along the workpiece surface.

[0023] Preferably there is provided a tab guide for guiding the tab from the forwardmost position to the stapling position and for holding the tab in the stapling position.

[0024] Preferably the tab guide includes a pair of inwardly facing slots each for receiving a side edge portion of the tab, the tab being pulled from the slots by the staple which passes through a center portion of the tab between the slots.

[0025] Preferably the drive actuator is arranged such that the tab is moved to the stapling position in the tab guide subsequent to driving of a previous staple and prior to driving of the respective staple and is held in place awaiting the respective staple.

[0026] Preferably the drive actuator includes a lever pivotally mounted for movement in a plane parallel to the workpiece surface and driven by the second driver.

[0027] Current methods of applying wrapping material, usually plastic, involve the use of rectangular, square or round "tabs" or washers through which staples are driven in order to prevent lumber wrapping material from tearing away from the lumber it covers.

[0028] There are in use, a number of methods which present these "tags" from a magazine or dispenser to a power operated staple gun. This allows the operator to use his free hand to manipulate the wrapping material and generally eases his job as well as reducing the time needed to protect the wood products.

[0029] One major disadvantage of the above described method is that at some point, either here or offshore, the wrapping material must be removed. This generally entails the removal by hand of the large number of staples in the product. Failure to do so can cause sever damage to tools or machines used in the further processing of the wood products. A considerable percentage of the wood shipped this way is subjected to further processing and foreign objects such as staples can damage expensive saw and planer blades.

[0030] Tests have shown that using a certain type of woven strapping material instead of individual tabs or washers as a method of preventing the wrap from tearing away from the staples during shipping and handling can drastically reduce the effort required to remove these staples when it is time for further operations on the product.

[0031] According to a second aspect of the invention there is provided a stapler comprising:

[0032] a staple gun having:

[0033] a staple magazine;

[0034] a staple driving head;

[0035] a drive assembly, including a manually operable trigger, for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a workpiece surface to a stapling position on the workpiece surface such that a staple from the magazine is driven into the workpiece;

[0036] a strip material for attachment with the staples to the workpiece;

[0037] a supply assembly of the strip material arranged including a supply container such that the strip material can be pulled from the supply container, the supply assembly being mounted on the stapler and including a supply guide arranged such that, as the material is pulled from the supply container, the strip material passes across the stapling position and such that, as the staple is driven into the workpiece, both legs of the staple pass through the strip material;

[0038] the strip material having a strength such that, when the strip material is pulled from the workpiece, the staple is pulled from the workpiece with the strip.

[0039] Preferably the strip material is reinforced by fibers.

[0040] Preferably the fibers extend diagonally.

[0041] Preferably the strip material is supplied in a roll which is driven solely by pulling on the strip material.

[0042] Preferably the strip material is supplied in a roll and wherein there is provided a tensioner for resisting pulling of the strip material such that the strip material is laid across the surface under tension as the staple gun is pulled across the surface.

[0043] According to a third aspect of the invention there is provided a method of wrapping an article comprising:

[0044] providing a supply of an elongate strip material;

[0045] providing a staple gun having: a staple magazine, a staple driving head, a drive assembly, including a manually operable trigger, for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a surface of the article to a stapling position on the surface such that a staple from the magazine is driven into the article;

[0046] mounting the supply of the strip material in a supply container of a supply assembly attached to the staple gun;

[0047] arranging the supply assembly of the strip material such that the strip material can be pulled from the supply container;

[0048] providing a guide on the supply assembly and causing the guide to effect guiding of the strip material from such that, as the material is pulled from the supply container, the strip material passes across the stapling position and such that, as the staple is driven into the workpiece, both legs of the staple pass through the strip material;

[0049] applying a staple to the article to attach the strip material to the article at a selected location thereon;

[0050] pulling the staple gun across the article so as to pull the strip material across the article, periodically operating the trigger to apply staples through the wrapping strip material at spaced positions along the length of the strip material to effect wrapping of the article with a length of the strip material, and cutting the strip material after the wrapping with the length of strip material is completed;

[0051] and, after the wrapping is completed and when it is required to un-wrap the article, pulling the strip material from the article;

[0052] and arranging the strip material to have a strength such that, when the strip material is pulled from the article, the spaced staples are pulled from the article with the strip.

[0053] Preferably the strip material is applied over a sheet wrapping material to effect closure of the wrapping material around the article.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0054] Embodiments of the invention will now be described in conjunction with the accompanying drawings in which:

[0055] **FIG. 1** is side elevational view of a first embodiment of stapler according to the present invention.

[0056] **FIG. 2** is a front elevational view of the stapler of **FIG. 1**.

[0057] **FIG. 3** is a top plan view of the stapler of **FIG. 1**.

[0058] **FIG. 4** is a cross sectional view of the stapling position of the stapler of **FIG. 1**.

[0059] **FIG. 5** is a schematic illustration of a first arrangement of pneumatic circuit driving the main drive cylinder of the stapler head and the actuator cylinder of the tab drive.

[0060] **FIG. 6** is a schematic illustration of a second arrangement of pneumatic circuit driving the main drive cylinder of the stapler head and the actuator cylinder of the tab drive.

[0061] **FIG. 7** is an isometric view of an article wrapped by a wrapping material in the form of a bag and stapled using the staples and tabs of the embodiment of **FIG. 1**.

[0062] **FIG. 8** is an isometric view of an article wrapped by a wrapping material in the form of a bag and stapled using the staples and strip material of the embodiment of **FIG. 9**.

[0063] **FIG. 9** is a side elevational view of a further embodiment of stapler according to the present invention including a supply of a strip material for reinforcing the area under the staples.

[0064] **FIG. 10** is an isometric view of a portion of the strip material and a single staple of **FIG. 8**.

[0065] **FIG. 11** is a schematic illustration similar to that of **FIGS. 5 and 6** showing a circuit arrangement of an electric stapler according to the present invention.

[0066] In the drawings like characters of reference indicate corresponding parts in the different figures.

## DETAILED DESCRIPTION

[0067] Turning firstly to the embodiments shown in FIGS. **1** to **7**, a conventional staple gun **10** actuated by pneumatic pressure from a supply line **11** includes a staple magazine **12** which forwards staples in a horizontal direction that is in a direction parallel to the intended surface of the workpiece toward a stapling position **13**. A stapler head **15** is mounted in a housing **16** and is movable in a direction generally at right angles to the surface and to the staple magazine. The stapler head within the housing **16** is driven by a cylinder **17** actuated by pneumatic pressure from the source **11** through a trigger **18** and control circuit **19**.

[0068] One example of a circuit is shown in **FIGS. 5 and 6** where the trigger simply supplies pressure to the cylinder **17** for driving the head against the bias of a spring **17**A. other circuits are well known to one skilled in the art and could be used if required for particular characteristics.

[0069] The trigger **18** is mounted underneath a handle **20** which is parallel to the magazine **12** leaving a space between the magazine and the handle for the fingers of the user to engage with trigger **18**.

[0070] In general, the staples in the magazine are fed along the length of the magazine to the stapling position and each stroke of the head driven by the cylinder **17** acts to separate one staple and drive it from the magazine into the workpiece.

[0071] In order to reinforce the staple and to resist the staple tearing through a wrapping material, there is provided a plurality of individual tabs **30** which are arranged in a vertical magazine **31**. The tabs are flat and formed of a plastics material such that each has sufficient thickness to act as reinforcement and each is separate from the next and simply formed into a stack for mounting in the magazine. The magazine thus forms a sleeve surrounding the stack and guiding the stack to move in a direction at right angles to the flat plane of the tabs. The tabs can be supplied in a wrapping material and the stack including the wrapping material can be inserted into the magazine for sliding along the magazine as the tabs are fed one at a time to the stapling position.

[0072] At the bottom of the magazine is provided a bottom plate **32** onto which the stack of tabs is pressed by a plate **33**. The plate **33** extends through a slot **34** in one sidewall of the magazine with a collar **35** engaging onto a vertical rod **36** standing upwardly from the plate **32** alongside the magazine. A spring **37** on the rod **36** presses the collar **35** downwardly so as to press the plate **33** onto the top of the tabs in a forwarding action. The spring is held in place by a top nut **38** on the upper end of the rod **36**. The spring has a length and arrangement so that it applies substantially constant force to the tabs regardless of the number of tabs in the magazine from a full condition through to the last one of the tabs when the plate **33** reaches the bottom plate **32**.

[0073] The magazine is shown as square but other shapes of magazine can be used including oval and circular so as to receive tabs of corresponding shape. In the alternative, the rectangular magazine can be used for circular tabs and the tabs are sized so that the staple engages with both legs passing through the tab.

[0074] The tabs are forwarded from the bottom of the magazine by sliding action across the top of the plate **32**. This action is effected by a lever **40** in the form of a flat plate which slides across the top of the plate **32** and is mounted for pivotal movement relative to the plate **32** on a pivot pin **41**. There is a slot between the bottom edge of the magazine as indicated at **43** and the top surface of the plate **32** through which the flat lever **40** passes in a pushing action on the bottom action on the bottom tab. The slot **43** is dimensioned relative to the tab so that only a single one of the tabs slides out of the magazine across the top of the plate while the remaining tabs are held in position within the magazine.

[0075] The tabs are pushed from the bottom of the magazine into a guide **45** which is located at the stapling position and is aligned with the bottom plate **32** so that the staple

sliding over the top surface of the bottom plate **32** slides into the guide **45** as best shown in **FIG. 4**. The guide **45** comprises a pair of side guide elements **46** and **47** each of which forms a slot facing inwardly toward the other of the guide elements so that the side edges of each tab engage into the slot and thus the side edges are held within the side guides while a central part of the tab is exposed and held in the guide. Thus the central part of the tab is located underneath the stapling position so that the staple can pass through the tab at the stapling position while it is held in position.

[**0076**] The side guides **46** and **47** are dimensioned to receive only the side edges of a tab such that the tab is held in place while in the guide but can be readily released from the guide by simply pulling the stapler and the associated elements away from the work piece surface so that the center part of the tab remains in place under the staple and the side edges of the tab are pulled out of the side guides. This is effected by slight bending action of the tab without significantly restricting the movement of the stapler so that the user is not hampered or restricted by the tab being held to tightly.

[**0077**] The pivot point **41** of the lever **40** is spaced away from the magazine and is located at a position spaced along the handle so that the lever extends substantially parallel to the handle along the upper surface of the plate **32**. The plate **32** thus extends to a rear end **32**A partway along the magazine **12**. The plate includes an upturned tab **32**B which is attached to the side of the magazine by a fastener **32**C. Thus the plate is held rigid against the side of the magazine and projects outwardly from the side of the magazine so that a side edge **32**D of the plate lies alongside the side edge of the magazine. The front edge of the plate terminates at the bottom of the tab magazine as indicated at **32**E.

[**0078**] The lever thus extends substantially along the plate so that its forward end includes a rounded nose portion **50** for engaging the side edge of the bottom tab. The rounded nose provides point contact with the tab to reduce the possibility of twisting and jamming of the tab in the bottom of the magazine. The lever includes a crank so as to provide a space on the inside of the crank for a return spring **51** and an actuating cylinder **52**. Thus the spring **51** biases the lever to a position to the right of that shown in **FIG. 3** so that the nose of the lever is outside the magazine **31**. The cylinder **52** is actuated to pull the lever into the position underneath the magazine so as to push the first tab into the guide.

[**0079**] The cylinder **52** is actuated as shown in the circuit diagram of **FIG. 5** so that the cylinder **52** is actuated in response to pneumatic pressure available at the beginning of the cycle of the stapling action so that the tab is moved into position within the guide by the commencement of the stapling action so that the tab is ready when the stapling action occurs. The pressures to the cylinders is controlled so that the tab moves first and completes its action before the staple is fired.

[**0080**] The cylinder **52** is actuated as shown in the circuit diagram of **FIG. 6** so that the cylinder **52** is actuated in response to pneumatic pressure available at the end of the cycle of the previous stapling action from the exhaust of the previous stapling action so that the tab is moved into position within the guide by the previous stapling action.

[**0081**] The operation is as follows:

[**0082**] Magazine **31** contains a number of round or rectangular 'tabs' or washers.

[**0083**] To begin, manual operation of arm **50** moves a tab into position in guides **45**.

[**0084**] Operation of the staple gun trigger valve causes air to move the driver piston of the staple gun within its bore to drive the staple through the tab and into the target material. When the piston has travelled its required distance, it uncovers an exhaust port in the cylinder wall allowing pressure to bleed off and the piston return spring to return the piston to its rest position.

[**0085**] The momentary build-up of pressure in the exhaust port is ducted to a line (not shown) connected to cylinder **52** which moves arm **50** causing a tab to slide from the magazine into the grooved guides until it positioned beneath the staple gun head.

[**0086**] As the pressure in the exhaust duct **17**B, the line **17**C connecting it to cylinder **17** and cylinder drops to atmospheric pressure the return spring **51** moves arm **50** back to its rest position, ready to advance another tab when required.

[**0087**] When arm **50** has retracted, spring **51** and follower press another tab into position. This operation is repeated each time the staple gun is operated.

[**0088**] There are a number of methods of tapping a supply of air from the staple gun but, in this case and for the sake of simplicity, the air to operate cylinder is taken from the exhaust chamber that fills when the staple gun driver piston has completed its travel and driven a staple. This will cause arm to move a 'tab' from the bottom of magazine into a position for another cycle Most compressed air operated staple guns have a number of places from which air may be ducted to operate other components. Air from the intake connection is carried through a channel in the body to rest on the trigger operated air valve. Pressure at this point is constant as long as the unit is connected to an air supply.

[**0089**] Operation of one or more accessory air cylinders may be obtained by tapping into the above described ducts. In the case of the advance mechanism for tabs or washers, it is convenient to access the exhaust duct. The exhaust duct contains a sudden build-up of pressure when the driver piston has uncovered the port and this pressure is sufficient to operate a cylinder, usually with a spring return, and at a time when the staple gun driver head has returned to its rest position, ensuring clearance for another tab or washer to be forced into position. Should this momentary pressure rise be insufficient, partial restriction of the outer end of the exhaust duct will cause a suitable increase without affecting the operation of other portions of the mechanism.

[**0090**] Connections to these ducts are usually made by drilling into the appropriate areas of the staple gun body casting and tapping the resulting hole to accept a suitable pipe or hose fitting.

[**0091**] The tab magazine as shown in **FIG. 1** is thus located alongside the head. In an alternative arrangement the tab magazine may be just beyond the head that is on the front side of the head opposite to the handle. However this is less preferred as the operation of the lever which effects the pushing action is more difficult and the whole system more bulky. The tab is preferably ejected from the guides by the stapling action which drives it toward the workpiece. How-

ever if this does not occur, simply pulling the stapler away from the surface will release the tab and leave it behind on the surface under the staple.

[0092] As shown in **FIG. 7**, there is shown an article **100** wrapped by a wrapping material **101** where the wrapping material is attached to the article to maintain it in place, against blowing in the wind or pulling by contact with adjacent articles, by a plurality of the staples **102** and associated tabs **103**. The staples are located at various places to attach the wrapping and particularly at folded edges **105**.

[0093] Referring now to the second embodiment shown in **FIG. 11**, there is shown an Electrically Operated Tab/Tag Feeding Device.

[0094] An electrically powered tool is more efficient than pneumatic units in that electrical power (line current) does not have to be converted to mechanical power (compressor motor) and then into compressed air for use in the staple gun. (An estimated 70% loss, 30% in the motor+40% in the compressor.)

[0095] The general use of plastics and solid state controls makes for a durable tool, unaffected by temperature or humidity and well able to stand rough usage.

[0096] As shown in **FIG. 11**, the stapler is of a conventional electrically operated type including an electric staple driver in the form of a driving solenoid or driving motor **120** controlled by a trigger module **121** from a power source **122**. Tab advancement is accomplished by a second electrical solenoid or motor **123**, separate from the solenoid or motor **120** which powers the staple driving head. The advance solenoid or motor **123** can be made to operate by a timer module **124** of known available construction over a controllable amount of time after the last staple is driven. This timer control can be operator adjustable or fixed. A tab position sensor **125** can be provided to ensure that the tab is in place before the first solenoid is operated to drive the staple.

[0097] The above arrangement can be used with the tab magazine described above in which case no cutting action of the tabs or tags is required since they are already separate. However in the event that the above arrangement is used with a rolled supply of the tabs or tags, the cutting actions, if required, are controlled by a third electrical solenoid or motor **126** through a second timer module **127** which can also be made to operate in a timed manner.

[0098] The principal of operation is as follows:

[0099] With a tab in position, operation of the trigger switch causes electrical current to be directed to the staple driving solenoid or motor which forces a staple through the presented tab. (This is dependent upon there being a tab in position.) If there is no tab in position a sensor prevents current reaching the trigger switch. This circuit provides a safety mechanism and may be incorporated with a contact switch to prevent operation of the tool unless it is positioned against a solid surface.

[0100] It should be noted that the current supplied to the operating solenoids is in the form of a short "burst" of a suitable duration to operate the solenoid after which a spring returns the solenoid to its rest position. This is a function of the trigger switch and timer module circuitry.

[0101] At the same time, current is supplied to the cutting device operating solenoid. Also, at this time, current is switched to a timing circuit which begins a count, the length of which is controlled by an adjustable potentiometer.

[0102] When the predetermined count has reached its upper threshold level, the output goes high, allowing a silicon controlled relay (SCR1) to switch full current to the tab advance solenoid.

[0103] At this time, a second relay (SCR2) is actuated to cut off current to the staple gun trigger switch, thus preventing another firing until another tab is in the correct position for attachment.

[0104] Actuation of SCR2 also causes the beginning of a predetermined count of a suitable time length to allow the advance mechanism solenoid to position a new tab under the staple head and when this count is complete, SCR2 is allowed to return current to the staple gun trigger switch.

[0105] A light sensing diode (LSD1) is incorporated into the circuit in a position which allows it to sense the presence of a tab in the outlet of the feeding device. If a tab is not in position, (high output) the signal is conducted to the circuitry of SCR2 which continues to prevent operation of the staple gun until the supply of tabs has been replenished.

[0106] At the completion of the cycle, the tool has a tab in position to be stapled and current resting on the power supply side of the trigger switch.

[0107] In an electrically powered tabbing tool without a cutting device, the sequence of operations of actions would be essentially the same as described above with the exception of the presence of a cutting solenoid and its circuitry.

[0108] This type of tool might be developed for use with individual tabs contained in a magazine. In this situation the advance solenoid would operate in a similar manner as would the light sensing diode and the staple driving solenoid.

[0109] Referring now to the third embodiment shown in **FIGS. 8, 9** and **10**, the staples **130** are driven through the fiber or thread reinforced tape **131** at right angles to its length.

[0110] The fibers **132, 133** in the webbed tape are at the diagonal to its length back and forth across the strip or tape from side edge fibers **134** and any staple applied to it will cross a large number of these diagonal fibers. The diagonal fibers that are trapped under the horizontal portion of a standard industrial staple are strong enough to cause the staple to pull out of the target material when the length of tape is removed by pulling it away from the wrapped product shown in **FIG. 8**.

[0111] The stapler **135** shown in **FIG. 9** is of the same basic construction as that shown previously and includes an electrical or pneumatic staple gun **136** and a strip material supply assembly **137** having a roll housing **138** to hold the roll of webbed tape.

[0112] The housing contains a guide or channel **139** to lead the tape from the roll, down the front of the staple gun and underneath the staple position to the head of the staple gun.

[0113] A part of this guide is a block of metal or plastic **140**, placed so as to apply pressure to the tape, pressing it

against a part of the guide acting as an adjustable tensioner in order to create a friction to prevent the tape from unreeling freely.

[0114] This block **140** is positioned against a screw or threaded adjustment in order that the pressure on the tape can be varied. Another method uses a tension spring to apply pressure to the friction producing block.

[0115] Operation of the unit involves bringing the first end of the tape to the staple gun head and then driving in a staple to fasten it to the target material. The gun and reel assembly may then, without lifting it from the surface of the target material, be moved by a pulling action in a forward direction to apply the tape. At intervals determined by the operator, staples may be driven through the tape into the target material. This arrangement is shown in **FIG. 8** where the strip or tape wraps around the open bottom **141** of a bag **142** covering a stack of lumber pieces **143**. The covering bag is a conventional arrangement to wrap such lumber and is shaped to engage over the stack. The bag is then pulled tight manually at the bottom and the mouth sealed around the bottom of the stack, which may be on a pallet. The use of the strip quickly and easily closes the bottom and holds the bottom fully closed around its full periphery. In addition all of the staples are quickly and easily removed in one action by pulling the stapled strip from the stack for removing the bag and using the product.

[0116] In most cases, the cutting of the strip is effected manually since a full length is wrapped around the whole stack and thus cutting is infrequent. However, it would not be difficult to incorporate a cutting device into the tool, considering that the reel will hold several hundred feet of tape, cutting would be required only at the end of each wrapped block of lumber. The dimensions of the smallest stack of lumber commonly wrapped would total approximately 32 feet. When he has finished stapling the tape to all sides of the lumber stack, the operator will have on free hand with which to cut the tape.

[0117] Since various modifications can be made in my invention as herein above described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without department from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

**1**. A stapler comprising:

a staple gun having:

a staple magazine;

a staple driving head;

a drive assembly for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a workpiece surface to a stapling position on the workpiece surface such that a staple from the magazine is driven into the workpiece, the drive assembly including a first electric driver and a trigger for controlling actuation of the first electric driver such that each operation of the trigger effects one forwarding movement of the staple driver head;

a supply magazine for supplying a plurality of substantially planar flat elements one at a time to the stapling position such that the staple passes through the flat element at the stapling position to fasten the flat element to the workpiece;

and a reciprocating drive actuator for effecting movement of the flat elements to the stapling position, the drive actuator including a second electric driver;

and a timing circuit for controlling actuation of the second electric driver relative to actuation of the first electric driver such that the flat element is located at the stapling position when the staple driver head is actuated.

**2**. The stapler according to claim 1 wherein the supply magazine comprises a sleeve member for receiving a plurality of substantially planar, separate tabs in a stack of the tabs arranged each on top of the next, the magazine being arranged to support the stack in a direction generally parallel to the movement of the driver head and at a position to one side of the driver head, a spring feeding the tabs forwardly of the magazine to a forwardmost position, a drive member for moving a tab at the forwardmost position to the stapling position such that the staple passes through the tab at the stapling position to fasten the tab to the workpiece and a reciprocating drive actuator for effecting movement of the drive member in a moving action from the forwardmost position to the stapling position and back to the forwardmost position for moving another tab, the drive actuator including the second electric driver.

**3**. The stapler according to claim 2 wherein the staple magazine is at right angles to the head so as to lie along the workpiece surface.

**4**. The stapler according to claim 2 wherein there is provided a tab guide for guiding the tab from the forwardmost position to the stapling position and for holding the tab in the stapling position.

**5**. The stapler according to claim 4 wherein the tab guide includes a pair of inwardly facing slots each for receiving a side edge portion of the tab, the tab being pulled from the slots by the staple which passes through a center portion of the tab between the slots.

**6**. The stapler according to claim 4 wherein the drive actuator is arranged such that the tab is moved to the stapling position in the tab guide subsequent to driving of a previous staple and prior to driving of the respective staple and is held in place awaiting the respective staple.

**7**. The stapler according to claim 2 wherein the drive actuator includes a lever pivotally mounted for movement in a plane parallel to the workpiece surface and driven by the second driver.

**8**. A stapler comprising:

a staple gun having:

a staple magazine;

a staple driving head;

a drive assembly, including a manually operable trigger, for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a workpiece surface to a stapling position on the workpiece surface such that a staple from the magazine is driven into the workpiece;

a strip material for attachment with the staples to the workpiece;

a supply assembly of the strip material arranged including a supply container such that the strip material can be pulled from the supply container, the supply assembly being mounted on the stapler and including a supply guide arranged such that, as the material is pulled from the supply container, the strip material passes across the stapling position and such that, as the staple is driven into the workpiece, both legs of the staple pass through the strip material;

the strip material having a strength such that, when the strip material is pulled from the workpiece, the staple is pulled from the workpiece with the strip.

**9**. The stapler according to claim 8 wherein the strip material is reinforced by fibers.

**10**. The stapler according to claim 9 wherein the fibers extend diagonally.

**11**. The stapler according to claim 8 wherein the strip material is supplied in a roll which is driven solely by pulling on the strip material.

**12**. The stapler according to claim 8 wherein the strip material is supplied in a roll and wherein there is provided a tensioner for resisting pulling of the strip material such that the strip material is laid across the surface under tension as the staple gun is pulled across the surface.

**13**. A method of wrapping an article comprising:

providing a supply of an elongate strip material;

providing a staple gun having a staple magazine, a staple driving head, a drive assembly, including a manually operable trigger, for effecting a forwarding movement of the staple driver head in a direction substantially at right angles to a surface of the article to a stapling position on the surface such that a staple from the magazine is driven into the article;

mounting the supply of the strip material in a supply container of a supply assembly attached to the staple gun;

arranging the supply assembly of the strip material such that the strip material can be pulled from the supply container;

providing a guide on the supply assembly and causing the guide to effect guiding of the strip material from such that, as the material is pulled from the supply container, the strip material passes across the stapling position and such that, as the staple is driven into the workpiece, both legs of the staple pass through the strip material;

applying a staple to the article to attach the strip material to the article at a selected location thereon;

pulling the staple gun across the article so as to pull the strip material across the article, periodically operating the trigger to apply staples through the wrapping strip material at spaced positions along the length of the strip material to effect wrapping of the article with a length of the strip material, and cutting the strip material after the wrapping with the length of strip material is completed;

and, after the wrapping is completed and when it is required to un-wrap the article, pulling the strip material from the article;

and arranging the strip material to have a strength such that, when the strip material is pulled from the article, the spaced staples are pulled from the article with the strip.

**14**. The method according to claim 13 wherein the strip material is reinforced by fibers.

**15**. The method according to claim 14 wherein the fibers extend diagonally.

**16**. The method according to claim 13 wherein the strip material is supplied in a roll which is driven solely by pulling on the strip material.

**17**. The method according to claim 13 wherein the strip material is supplied in a roll and wherein there is provided a tensioner for resisting pulling of the strip material such that the strip material is laid across the article under tension as the staple gun is pulled across the surface.

**18**. The method according to claim 13 wherein the strip material is applied over a sheet wrapping material to effect closure of the wrapping material around the article.

* * * * *