Nov. 23, 1965 W. I. KREWSON, JR 3,219,248

ATTACHMENT DEVICE FOR IMPACT TOOLS AND THE LIKE

Filed Oct. 24, 1963

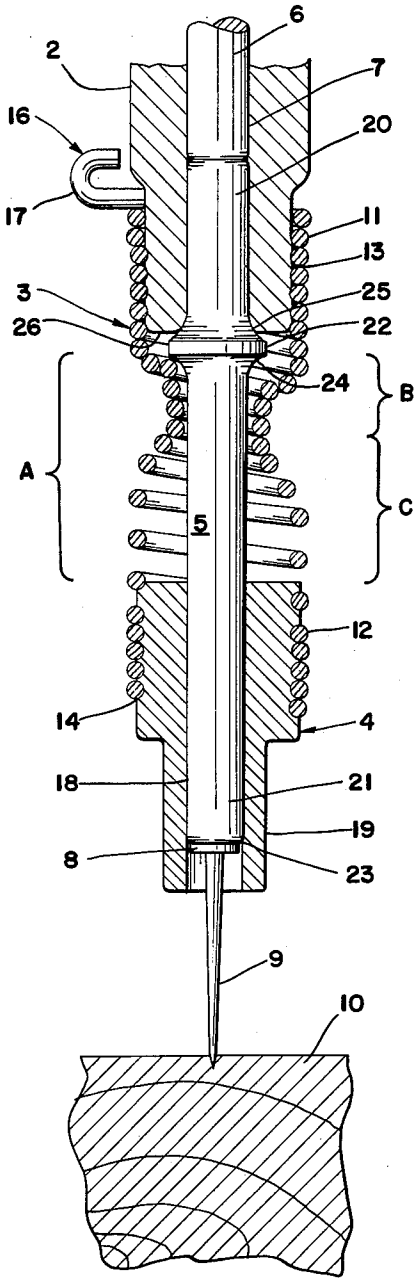


Fig. 1

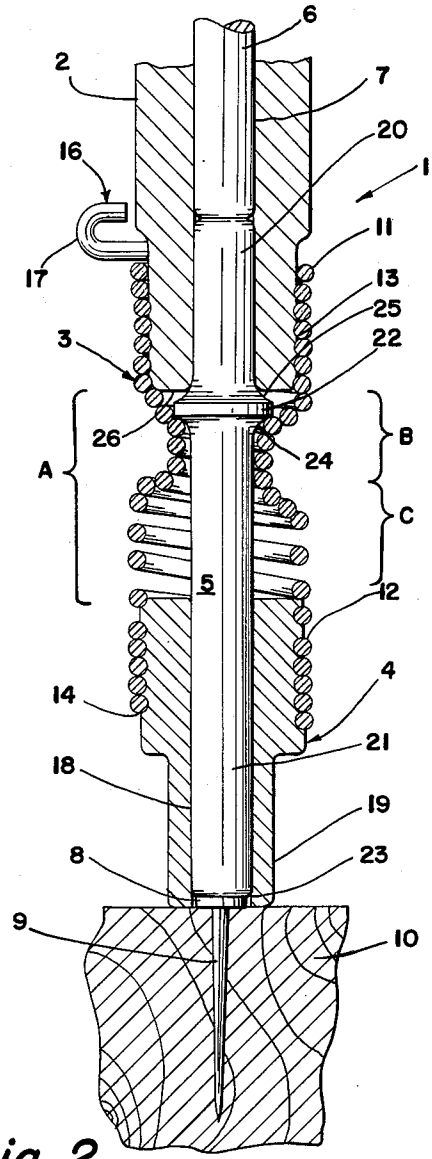


Fig. 2

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United States Patent Office 3,219,248 Patented Nov. 23, 1965

3,219,248

ATTACHMENT DEVICE FOR IMPACT TOOLS AND THE LIKE

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Filed Oct. 24, 1963, Ser. No. 318,575
1 Claim. (Cl. 227—140)

This invention relates generally to an attachment device for impact tools and more particularly relates to an improved nailer attachment device for use with pneumatic impact type hammers in driving friction fasteners into various construction materials.

Heretofore, conventional building construction has been impeded by the absence of a method by which friction fasteners such as nails, spikes and the like, could be rapidly and accurately driven into various building materials without repeated bending and twisting of the fasteners and without having to remove and/or replace the fasteners to prevent cracking, splitting and other such damage to the work piece. Such difficulties and the attendant cost and delays which inure therefrom have been a particular problem with the advent of pre-fabricated building construction wherein the various components are joined together by assembly-line methods. Moreover, because nailing is a primary factor in general as well as in pre-fabricated construction, the rate and hence the cost of such construction has heretofore been limited by conventional type facilities and methods of nailing.

In general, the present invention contemplates the provision of an improved resilient-type nailer attachment for use with pneumatic or other such impact hammers in driving friction fasteners into various types of construction materials. The improved nailer attachment of the present invention is particularly designed for use with conventional type pneumatic impact hammers which are normally of a small, light-weight construction for efficient single hand operation. A hammer of this type may weigh between three and four pounds and is usually trigger actuated to deliver up to 3500 blows per minute to the head of the fastener.

The improved nailer attachment per se is of a simple yet rugged construction which provides quick and efficient assembly and disassembly with an associated hammer and with a minimum of effort. The nailer attachment provides a wide range of useability in driving 8 penny to 30 penny nails and 8 inch to 10 inch spikes for tow or overhead nailing, furring, flooring, siding, decking and for nailing blind spots in crating, packing and pallets. It has been found, for example, that through use of the nailer attachment of the present invention, that 16 penny nails can be accurately driven into oak materials in 2.8 seconds and into pine materials in 1.8 seconds. It has further been found that such rapid and accurate nailing can be accomplished safely by relatively unskilled labor without bending or twisting the fasteners and without any damage whatever to the materials, as has heretofore been the case with conventional type nailing facilities and methods.

Accordingly, it is an object of the present invention to provide an improved nailer attachment device for use with pneumatic impact type tools in driving friction fasteners into various type construction materials.

Another object of the present invention is to provide a nailer attachment of the above type, which is effective, in operation, simple in construction and economical to produce, and which rapidly and accurately drives nails, spikes and the like into various construction materials without bending or twisting thereof and without damage to the work piece.

Another object of the present invention is to provide a nailer attachment of the above type including a resilient spring element, which may be quickly and easily attached and detached from the barrel of an associated pneumatic type tool with a minimum of effort.

Other and further objects of the present invention will be apparent from the following description and claim illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof, and what is now considered to be the best mode in which to apply these principles. Other embodiments of the invention embodying the same or equivalent principles may be applied by those skilled in the art, and structural changes may be made as desired without departing from the scope of the present invention.

In the drawings:

FIG. 1 is a vertical section view showing the novel nailer attachment of the present invention preparatory to the driving of a friction fastener into a work piece;

FIG. 2 is a fragmentary vertical section showing a portion of a conventional type pneumatic impact hammer and use with the novel nailer attachment of FIG. 1, and wherein a tool has been actuated to drive the friction fastener into the work piece.

Briefly, and with reference to FIGS. 1 and 2 of the drawings, there is illustrated the novel nailer attachment of the present invention, designated generally at **1**, assembled for use on the end of a cylindrical casing or barrel **2** of the aforementioned type of pneumatic impact hammer (not shown). The nailer attachment **1**, in its assembled condition, includes an open generally helical retention spring **3** which is adapted to be detachably connected at one end to a nailer housing **4** and at its other end to the afore-mentioned hammer casing **2**. An elongated impact plunger **5** is disposed axially through the retention spring **3** so as to be slidably and coaxially received at its upper end within the hammer casing **2** and at its lower end within the nailer housing **4**.

The pneumatic hammer is preferably provided with a fluid actuated piston **6** which is disposed for reciprocation within a cylindrical passageway **7** provided in the hammer casing **2**. The piston **6** is adapted to be actuated from a source of fluid pressure (not shown) so as to deliver a succession of impacts to the plunger **5** which impacting force is transmitted axially via the plunger **5** for delivering a series of blows to the head **8** of a conventional type fastener **9**, such as a nail, spike or the like, for driving such fastener into the desired work piece **10**.

More specifically, the retention spring **3** though designed especially for pneumatic type hammers, may also be utilized with any similar type impact tool. As illustrated in FIG. 1 of the drawings, the retention spring **3** is defined by a pair of tightly wound end portions **11** and **12** which preferably have approximately 3½ turns per inch and which have a diameter such that they may be readily threaded onto corresponding helical threaded portions **13** and **14** on the hammer casing **2**, and nailer housing **4**, respectively.

The end portions **11** and **12** of the retention spring **3** are joined together by an integral generally double-volute spring section, designated generally at A, which section has a diameter of approximately one-half that of the end portions **11** and **12** of the spring **3** at its minimum dimension. As shown, the double-volute section A is defined by a tightly wound upper conical portion B having about five turns in approximately 9/16 inch of length and a relatively loosely wound lower conical portion C having about five turns in approximately 1 9/16 inch of length, such that the lower conical portion C of the section has an axial resiliency of approximately twice that

of the upper conical portion B. This double-volute spring construction acts as a spacer or abutment means for the impact plunger 5 in the assembled condition of the nailer attachment and provides a maximum resilient shock absorbent characteristics between the nailer attachment and the work piece 10 for driving a friction fastener therein, as will hereinafter be more fully described.

One end of the helical end portion 11 of the spring 3 may be provided with a tang 16 which extends generally tangentially therefrom and which has a bight portion 17 to facilitate engagement by means of the fingers or by means of a suitable tool, such that the end portion 11 of the spring may be quickly threaded onto the corresponding helically threaded portion 13 of the hammer casing 2. Though the retention spring 3 has been illustrated as being made of a round wire material, it is to be understood that other polygonal and generally non-circular shaped wires are also contemplated in accordance with the principles of the present invention.

The nailer housing 4 is preferably of a generally cylindrical construction having an axial, open-ended passageway 18 extending therethrough and which passageway is of a diameter to slidably receive one end of the impact plunger 5 therethrough. The nailer housing 4 is provided at one end with the aforementioned helical threaded portion 13 to threadably receive the lower end portion 12 of the retention spring 3 and is provided at its other end with an elongated cylindrical portion 19 of reduced diameter which reduced portion facilitates insertion of the end of the nailer attachment into limited access areas, thereby providing ready access of the attachment into blind spots for nailing, crating, pallets and the like.

The impact plunger 5 for delivering repeated blows to a friction fastener is preferably of an elongate, solid construction made of a heat-hardened material, such as rolled steel. As illustrated, the plunger proper includes an upper cylindrical portion 20 having a diameter to be slidably received for reciprocating movement within the passageway 7 of the hammer casing 2, and a lower cylindrical portion 21 having a diameter so as to be slidably received for reciprocating movement within the cylindrical passageway 18 provided in the nailer housing 4. The upper 20 and lower 21 cylindrical portions of the plunger are preferably separated from one another by means of an annular flange 22 which projects radially outwardly therefrom and which divides the axial length of the plunger proper such that the lower portion 21 is approximately 2½ times greater in length than the corresponding upper portion 20. The flange 22 is of a larger diameter than that of the tightly wound upper conical portion B of the retention spring 3, such that the flange 22 is coactingly nested therein, thereby limiting axial movement of the plunger 5 in a downward direction preparatory to the application of force thereto upon actuation of the piston 6. This nesting coaction of the flange 22 within the upper conical portion B of the retention spring 3 functions to space the plunger 5 coaxially within the passageway 18, such that the driving end 23 of the plunger is spaced a sufficient distance from the end of the nailer housing 4 to readily accommodate the head portion 8 of a fastener 9 therein (FIG. 1). By this arrangement, relatively unskilled workmen can quickly and easily center the nailer attachment with the associated fastener and in a manner such that the fastener is maintained in exact axial alignment prior to and while being driven into the workpiece 10.

As illustrated, the flange 22 is also of a larger diameter relative to that of the axial passageway 7 in the hammer casing 2 for limiting axial movement of the plunger 5 in an upward direction. The flange 22 is preferably provided on either side thereof with radii 24 and 25, one of which radius 24 conforms generally in contour to the tightly wound upper conical portion B of retention spring 3 and the other of which radius 25 abuts against the lower annular end surface 26 of the hammer casing 2, such that the plunger 5 is maintained in a resiliently biased engagement against the hammer casing 2 when the nailer attachment is assembled with the pneumatic hammer.

In one form, the nailer attachment 1 is preferably preassembled and stored for use with any of the conventional type impact hammers. In such case, the lower portion 12 of the spring 3 is tightly and permanently threaded onto the corresponding helical threaded portion 14 of the nailer housing 4. The preassembled nailer attachment is then completed by inserting the impact plunger 5 down through the upper or free end of the spring 3 and coaxially within the passageway 18 of the nailer housing 4 until the radius 24 of the flange 22 is coactingly nested within the upper conical portion B of the spring to space and arrest further axial movement of the plunger relative to the nailer housing 4. With the impact plunger 5 thus inserted, the nailer attachment 1 may then be conveniently stored for ready application with any type impact tool.

The nailer attachment 1 may then be assembled with a pneumatic impact tool simply by inserting the other end portion 20 of the impact plunger 5 coaxially within the passageway 7 of the hammer casing or barrel 2 until the radius 25 of the flange 22 abuts against further movement of the plunger in an upward direction. Coincident with insertion of the plunger, the upper end portion 11 of the retention spring 3 is threaded onto the corresponding helical threaded portion 13 of the casing or barrel 2, by manual activation of the tang 16 until the flange 22 is in resilient biased engagement with the casing 2, as aforesaid.

In a typical application of the thus assembled nailer attachment, a conventional type friction fastener 9, such as a nail or spike, may be inserted axially head first into the space defined between the driving end 23 of the impact plunger 5 and the corresponding end of the nailer housing 4 until the head 8 of the fastener 9 is in coaxial abutment against the driving end 23 of the plunger. The pneumatic hammer with its depending nailer attachment may then be positioned over a workpiece 10 (FIG. 1) to commence the driving operation. Driving of the fastener is initiated by trigger actuation of the hammer which introduces fluid under pressure from a source (not shown) to reciprocate the piston 6 axially within the hammer casing 2 and concomitantly against the upper cylindrical portion 20 of the impact plunger. The reciprocating force of the piston 6 is transmitted axially via the plunger 5 to deliver a series of impacts to the head 8 of the fastener 9. As the fastener 9 is driven into the workpiece 10, the hammer casing 2 and the depending impact plunger 5 move downwardly as a unit, such that there is movement of the plunger 5 in a downward direction relative to the nailer housing 4 until the fastener 9 is completely seated in the workpiece. During such downward movement of the impact plunger 5 relative to the nailer housing 4, the double-volute spring section A of the retention spring 3 is compressed axially to dissipate the shock forces coincident with the delivery of a succession of impacts to the head 8 of the fastener 9, thereby maintaining the fastener in exact axial alignment with the hammer and associated parts until it is finally seated in the workpiece.

From the foregoing description and accompanying drawings, it will be seen that the nailer attachment of the present invention affords many advantages over conventional methods and facilities for driving fasteners, such as nails and spikes into various type construction materials. The nailer attachment is not only of a simple and rugged construction but the resilient retention spring arrangement provides a device which may be quickly and easily assembled and disassembled for use with any conventional type impact tool and particularly with a pneumatic type impact hammer. The double-volute con-

struction of the retention spring provides an advantageous axial displacement of the impact plunger, such that a friction fastener may be quickly inserted into position for use therewith and accurately driven into a workpiece and in exact axial alignment with the hammer, so as to prevent bending or twisting thereof during its installation. Such spring construction further provides highly effective resilient shock absorbent characteristics which prevents the hammer from glancing off or being deflected from the fastener as it is driven into the workpiece whereby relatively unskilled labor can accomplish any type of nailing and under extremely adverse working conditions.

I have shown and described what I consider to be the preferred embodiment of my invention, together with suggested forms, and it will be obvious to those skilled in the art that any other changes may be made without departing from the scope of my invention, as defined by the appended claim.

I claim:

A nailer attachement device for use with a pneumatic impact of the type including a barrel having a bore extending therethrough, said device comprising an elongated housing having a passageway extending axially therethrough, an elongated, generally cylindrical driving member disposed at one end coaxially within the bore of said barrel and at its other end coaxially within the passageway of said housing for delivery of a succession of blows to a friction type fastener, said driving member having an annular flange intermediate its ends extending radially therefrom and engageable with the confronting

marginal portions of the barrel defined by the bore therein, a resilient, spring element disposed in encompassing relation about the driving member, said spring element having a tightly wound upper socket portion for threadable connection to said barrel and a tightly wound lower socket portion for threadable connection to said housing, said spring element including a generally double-volute section disposed below the flange on said driving member and extending coaxially intermediate said socket portions, said double-volute section including a tightly wound upper, generally conical portion axially movable relative to said driving member and having turns of wire which are disposed in generally contiguous relationship with one another for resiliently retaining the flange of said driving member in yieldable biased engagement against said barrel, and a relatively loosely wound lower generally conical portion having turns of wire disposed in progressively increased axial spaced relationship with one another in the relaxed condition of the spring element for absorbing the shock effects from the delivery of a succession of blows to the friction type fastener upon actuation of said impact hammer.

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