

Nov. 8, 1966

C. P. WILLIS
UPHOLSTERER'S PNEUMATIC TACK HAMMER DEVICE
AND CONTINUOUS TACK FEEDER COMBINATION

3,283,985

Filed Feb. 6, 1964

2 Sheets-Sheet 1

FIG. 1

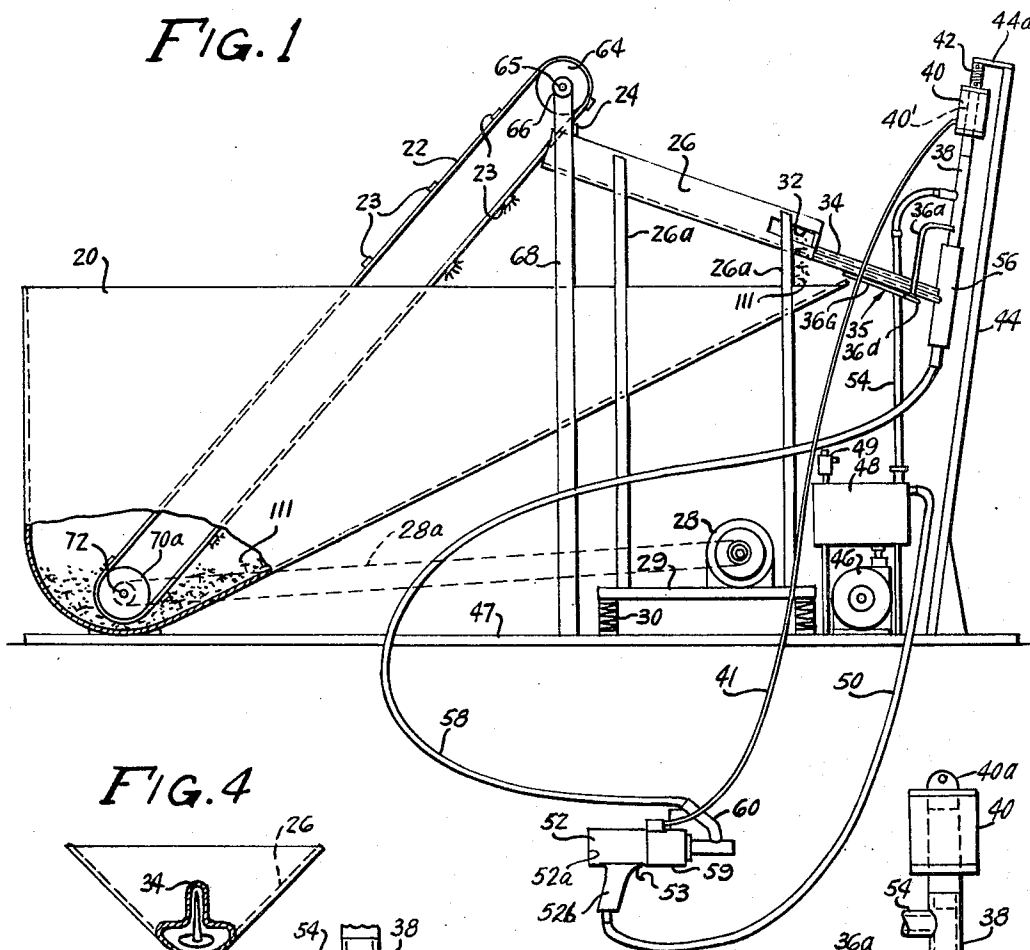


FIG. 4

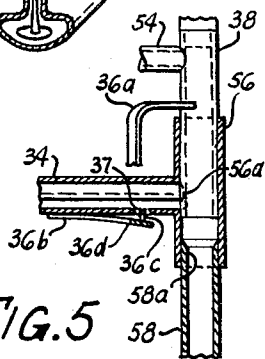
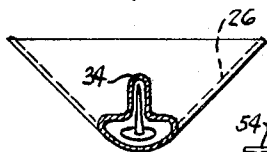


FIG. 5

FIG. 2

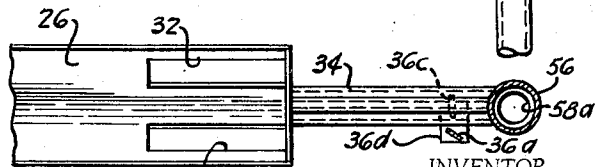
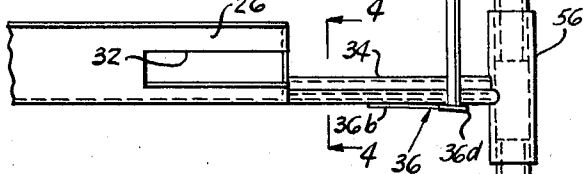


FIG. 3

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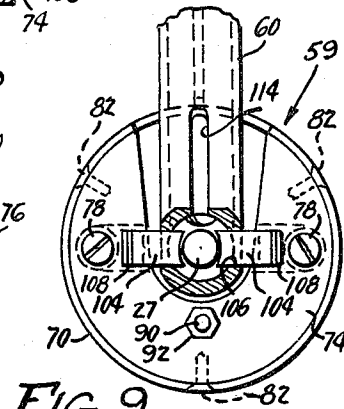
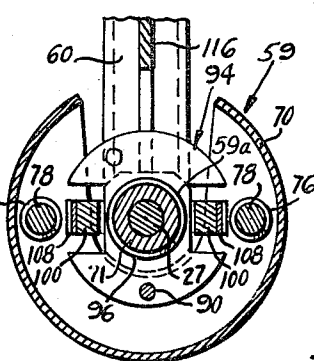
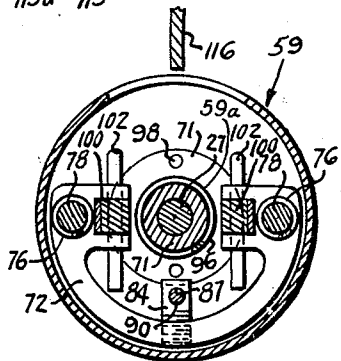
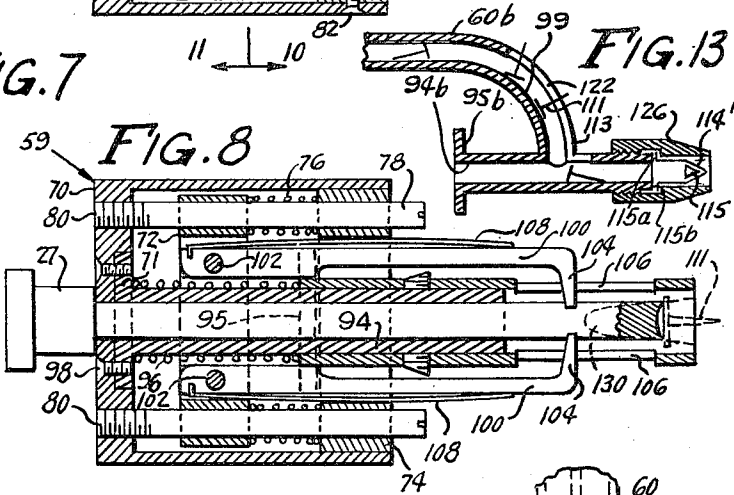
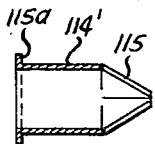
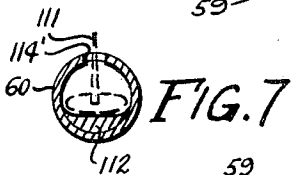
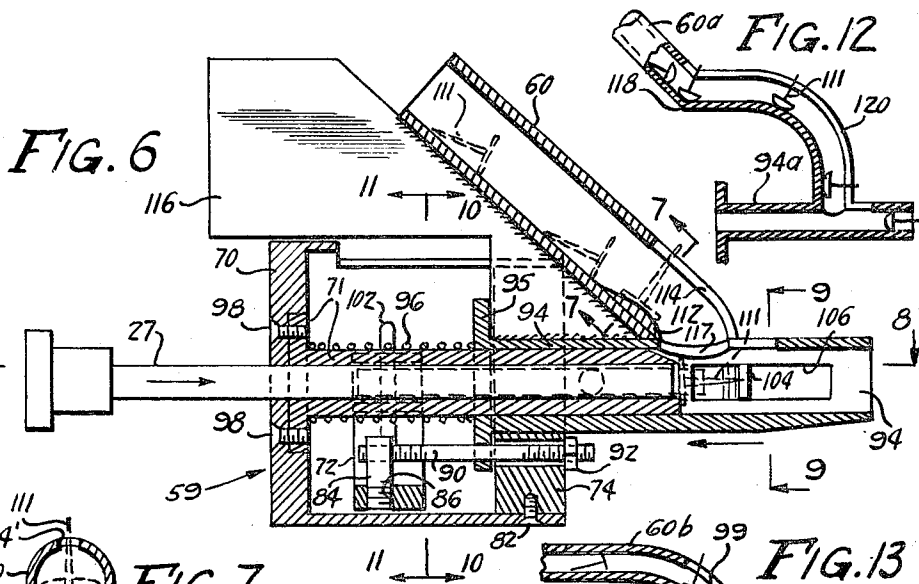


FIG. 11

FIG. 10

FIG. 9

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3,283,985

UPHOLSTERER'S PNEUMATIC TACK HAMMER DEVICE AND CONTINUOUS TACK FEEDER COMBINATION

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4 Claims. (Cl. 227-112)

This invention relates to improvements in tools and continuous feeding systems therefor, of the pneumatic driving type used by upholsterers. More particularly, the invention is an improvement to my prior Patent No. 2,994,880 issued August 8, 1961.

The use of magazines with the above type of driving hammer has created problems in renewal periodically of such magazine refills, as such magazines are restricted in the quantity of tacks they may hold. The instant invention solves the above problems by providing a substantially continuous and uninterrupted supply of driving material for the above type of pneumatic driving hammer or gun, the same being modified and improved for such continuous use without substantially clogging and servicing of the pneumatic hammer during a day's use by an upholsterer. This invention saves labor, time and additional cost of packaging refill tacks in small quantities in the form of magazines by providing a substantially continuous supply of such tacks.

The primary object of this invention is to provide such an improved pneumatically powered hammer device and continuous feeding system therefor.

An additional important object of this invention is to provide a pneumatic tack feeder system which will successively feed tacks for long periods of time from a supply bin and the like into the path of travel of a pneumatically operated tack driving hammer or gun means comprised of a plunger rod and barrel means which selectively and successively positions and drives upholster tacks upon contact therewith.

Another object of the invention is to provide a pneumatic tack hammer mechanism of the class described, which may be held at any particular location of a work area to drive a tack through a material medium by a pneumatically operated hammer rod and feeder barrel mechanism controlled by the movement of a trigger, thereby insuring the proper positioning of the tacks passing through the barrel mechanism preparatory to being driven into a work material by the tack hammer mechanism.

A further object of the invention is to provide a tool of the above character, which is supplied with a handle grip of pistol like form so that the driving hammer and feeding mechanism may be conveniently handled and manipulated with a minimum amount of effort on the part of the operator.

Yet another object of the invention is to provide a pneumatically operated gun wherein the hammer is moved to the rear end of the body of the barrel means compressing a coil spring held therein, provided for automatically releasing or selectively actuating the hammer rod in response to the action of the coiled spring, to suddenly urge the hammer rod forwardly into contact with a tack delivered in the path of travel of said hammer rod, positioning the tack into a desired material.

Still another object of the invention is to provide means for adjusting the tension of spring bias means to regulate the power stroke of the piston and spring detent means for holding a tack means in driving position for a particular use.

A further object of the invention is to provide a magnetic conveying means, a brush for removing tacks therefrom, vibrating sorting means, pneumatic means cooperating with centrifugal means for feeding a substantially

continuous supply of tracks into a pneumatic tack gun or hammer, of the class described.

Another object of the invention is to provide an upholsterer's pneumatic tack hammer and continuous tack feeder system combination which is simple to operate, easy to service and adapted to use various sizes and lengths of tacks.

Yet another object of this invention is to provide an improved barrel assembly means which will drive a tack straight into a work material without bending the body of the tack.

A further object of the invention is to provide, in combination with an improved pneumatic driving hammer means, a conveyor type of feeding means comprising a hopper tack supply, a permanent, magnetic conveyor belt means coacting with a brush which removes supply tacks into a vibrating tack sorting and positioning tray which further positions and feeds a supply of tacks in cooperation with a solenoid into a pneumatic feeding tube which selectively positions a tack in front of the driving hammer for each driving operation thereof.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combination of parts, hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts therein without departing from the spirit and scope of the invention as claimed.

Referring to the drawings:

FIGURE 1 is an elevational view of the assembly of the improved pneumatic tack hammer and tack feeder system combination of the present invention;

FIGURE 2 is an enlarged partial elevational view of the motor actuated vibrating tack sorting and positioning means connected to a solenoid gate and tack conduit according to the instant invention;

FIGURE 3 is a partial plan view of the tack sorting trough and feed back to the hopper connected to a partial cross-section of the pneumatic tack conveyor of the invention;

FIGURE 4 is a partial cross-sectional view of FIGURE 2 taken substantially on lines 4-4 in the direction of the arrows;

FIGURE 5 is a partial cross-sectional view of the tack conveyor tube from the vibrating tack sorting and positioning means before entry into the pneumatic tube conveyor of the pneumatic gun of the instant invention;

FIGURE 6 is a partial cross-sectional view in elevation of the pneumatic tack feeder tube connected before the plunger of the new pneumatic tack hammer and barrel combination of the present invention;

FIGURE 7 is a fragmentary cross-sectional view of the slotted tack dispensing tube of the instant invention taken substantially on line 7-7 of FIGURE 6;

FIGURE 8 is a longitudinal cross-sectional view of the improved reciprocating plunger and barrel mechanism of the invention taken substantially on lines 8-8 of FIGURE 6 in the direction of the arrows;

FIGURE 9 is a partial cross-sectional view of FIGURE 6 taken substantially on lines 9-9 in the direction of the arrows;

FIGURE 10 is a partial cross-sectional view of FIGURE 6 taken substantially on lines 10-10 in the direction of the arrows;

FIGURE 11 is a further partial cross-sectional view of FIGURE 6 taken on lines 11-11 in the direction of the arrows;

FIGURE 12 is a modified form of tack positioning conveyor tube and inner barrel of the new pneumatic hammer of the present invention;

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FIGURE 13 is a further modified partial cross-sectional view of FIGURE 12 with the addition of the screw cap and spring tack directing means of the present invention;

FIGURE 14 is an enlarged longitudinal cross-sectional view of the tack holding spring detent of FIGURE 13; and

FIGURE 15 is a right end elevational view of the spring of FIGURE 14.

Referring to FIGURE 1 in detail, the present invention is comprised, in general, of a hopper 20, a magnetic tack conveyor belt 22, a tack removal brush means 24, a vibrating trough 26 and tack positioning and sorting tube 34 and legs 26a mounted with an electric vibrating motor 28 on a platform 29 supported flexibly by spring means 30. Trough 26 includes a tack return aperture 32 to hopper 20 for unpositioned tacks 111. The tack positioning tube includes a tack loading gate generally indicated at 35 which passes tacks 111 into a sleeve 56 from which they are fed through a flexible tack feeding tube 58 to a tack positioning tube 60 operatively mounted on the inner barrel 71 of a tack gun 52. A support 44, which is mounted on base 47, which also carries hopper 20 and platform carrying springs 30, is provided with a substantially horizontal extension 44a, which flexibly supports, through a spring 42, and an apertured lug 40a, a solenoid coil 40, the latter being electrically connected by an electrical conduit 41 to gun 52.

Solenoid coil 40 reciprocates a core 40' which is connected by an actuating arm 36a to an extending lip 36d, carried by a leaf spring 36b which carries a stop or detent 36c, the latter extending through an opening 37 in tack carrying trough 34.

An air compressor 46 is mounted on a common base 47 which also supports hopper 20 and the bases of springs 30 of vibrating platform 29.

A compressed air tank 48 provided with a pressure relief valve 49 is pressurized by compressor 46 and supplies air under pressure, through a conduit 54 to air T38 immediately above a sleeve 56, immediately above an opening in the side thereof into which tack positioning tube 34 extends.

As best shown in FIG. 4 tube 34 is roughly in the form of an inverted T in cross section, with the base dimensioned to accommodate the tack head with the stem extending upwardly to accommodate the point and shank of the tack in inverted position. The tacks are vibrated by previously described vibrating trough 26 so that certain ones are properly positioned to enter tube 34 and the remainder, or those improperly positioned, are returned through aperture 32 to hopper 20.

A flexible tack feeding tube 58 extends from sleeve 56, to the tack positioning tube or inverter 60, which communicates with an opening 117 (FIG. 6) in outer barrel 95 of barrel assembly 59 of gun 52.

Conveyor belt 22 is supported on a roller 64 carried by shaft 65 in suitable bearings 66 in upstanding support 68 secured to common support base 47, and a roller 70a carried on shaft 72 and mounted in suitable bearings (not shown) in tack supply hopper 20. Either shaft 65 or 72 may be energized by motor 28 as by a belt and pulley drive 28a or by other desired means (not shown) as understood by those skilled in the art.

Conveyor belt 22 contains permanent magnetic means 23 selectively spaced thereon as desired or embedded in the belt itself for smoother contact with brush 24 which is a fixed brush and simply brushes tacks 111 from belt 22 into trough 26 as the tacks are conveyed from hopper 20 by belt 22.

Gun 52 includes a piston 27 which is mounted in a body 52a provided with a handle 52b and a trigger 53, compressed air being supplied thereto through a conduit 50 extending from tank 48, the operation being substantially identical to that of my previously mentioned Patent Number 2,994,880, whereby the plunger 27 is actuated inter-

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mittently to drive tacks fed into barrel 59a of barrel assembly 57.

The tack gun 52 is substantially the same as that shown in my Patent Number 2,994,880 issued August 8, 1961, with piston 27 connected to the new floating barrel assembly 59 comprising an element of the instant invention as shown in FIGS. 1, 6 and 8 and in FIG. 2B of Patent Number 2,994,880.

FIGURES 6, 8, 9, 10, and 11 show various sectional views of the new improved barrel assembly adapted for the present conveyor system in connection with centrifugal force and compressed air actuated tack positioning and feed means of the instant invention. Barrel assembly 59 is comprised generally of a case 70 supporting therein inner barrel 71, a spacer 72, an end plate 74, and compression springs 76 mounted on a screw rod 78 secured in threaded apertures 80 of case 70. End plate 74 is fixedly secured within case 70 by screws 82.

A post means 84 is threaded into an opening 86 in spacer 72. Post 84 has a threaded aperture 87 therein to receive a threaded rod 90. Rod 90 has an adjusting threaded nut 92 thereon for adjustment of spacer 72 with regard to end plate 74 for reciprocable movement of a flange 95 connected to outer barrel 94 against spring 96 mounted on inner barrel 71 to compensate for various tack lengths. Barrel 71 includes a flange 71a seated in the rear wall of case 70 is secured therein by screws 98.

Spacer 72 pivotally carries oppositely disposed dogs 100 secured therein by dowel pins 102. Each dog 100 terminates at its outer end in an extending hook 104 coming by opposed leaf springs 108 in slots 106 in inner barrel 71 to receive a tack before being driven.

As best shown in FIG. 6, tack positioning tube 60 has an arcuate surfaced protuberance 112 on its under side against which the head of a tack 111 impinges as it passes through tube 60; the tack is thus cammed into upright position with its point extending through a slotted aperture 114 for turning and positioning outwardly the sharp end of tack 111 before receipt in barrel 94.

Piston 27 reciprocates in inner barrel 71 as seen in FIG. 6, has a reinforcing web 116, is welded between the underside of tack positioning tube 60 and barrel 94.

FIGURE 12 discloses a modified form of tack positioning tube feed 60a integrally fixed to and communicating with barrel 94a in which is provided an obtuse angled depression in the underside which upon engagement with the head of a tack passing through tube 60a serves, in the same manner as abutment 112 of the preceding modification, to tilt the tack to upright position with its point extending outwardly through slot 120 as in FIGURE 6.

FIGURES 13, 14, and 15 show another modified form of tack positioning feed bend 60b, resilient conical tack director 114', and barrel assembly 94b corresponding to barrel 94, in which feed tube 60b contains therein a curved arcuate tack impinging surface portion 99 which reduces the effective diameter of tube 60b to turn the point of tack 111 forward and outwardly through a slot 122 by a slightly different mode of operation than shown in FIGURES 6 and 12, after which tack 111 is positioned with its head portion between dog hooks 104, as seen in FIGS. 6 and 8, then piston 27 travels forwardly through the pointed and split spring end 115 of tack director 114' and cap 126 to extrude and drive tack 111 into a desired work material (not shown).

Spring tack director is comprised of a pointed split or slotted conical contracted spring end 115 and flange 115a which is secured between a shoulder 115b in threaded cap 126 and the end of barrel assembly 94b, as best shown in FIGURES 13, 14, and 15.

It will be understood that the spring tack director 114' and cap 126 can be utilized with any of the embodiments of this invention.

A permanent magnet 130 (note FIG. 8) is carried in the forward portion of the piston 27 to carry the head of

the tack 111 until the latter is engaged in the work piece.

During operation of this invention tacks 111 are conveyed by magnetic belt 22 from hopper supply 20 and brushed off by brush 24 into vibrating trough 26 which allows unpositioned tack 111 to re-enter hopper 20 through aperture 32 and allows the positioned tack 111 to enter therefrom with head portions downwardly into positioning tube 34 which allows tack 111 to enter sleeve 56 by gate 35 operated by gun trigger 53 energizing solenoid means 40 and reciprocating compressed air T 38 and gate 35, allowing tack 111 to enter sleeve 56 and feeding tube 58 having a forwardly traveling supply of air therein to accelerate the flow of tack 111 therethrough to tack positioning tube 60 which positions a single tack 111 with its sharp end pointed forwardly between hooks 104 in barrel 94, after which trigger 53 of gun 52 actuates piston 27 forward releasing dogs 100 which cam over the head of a tack 111 against the bias of springs 108 as piston 27 drives the tack and driving tack 111 through spring tack director 114 into a desired work material (not shown). Dogs 100 serve to center the tack head on magnet 130 to insure alignment of the tack until the work piece is actually penetrated by the tool point.

In the operation of this invention, as shown, particularly in FIGS. 2 and 6, the extended lower portion of air T 38 reciprocates in unison with actuating arm 36a below the entry of tack positioning and sorting tube 34 into sleeve 56 positively preventing an inadvertent supply of tacks 111 to pass into feeding tube 58 and tack inverter 60 into barrel 94 connected to gun 52.

The novel tack hammer device and continuous tack feed combination of this invention has the advantage of feeding the tacks 111 from vibrating trough 26 with the head of the same first because of the configuration of the tack positioning tube 34 shown in FIG. 4. This precludes the possibility of jamming the feeding mechanism by catching the point of the tack 111 along the way. The novel tack positioning tube 60, 60a or 60b shown in FIGS. 6, 12 and 13, respectively, inverts the tack 111 immediately before feeding the same into the gun 52. The wiring and circuit connections of the entire assembly including energizing means for solenoid 40 are conventional and therefore not shown for the purpose of clarity.

From the foregoing it will be now seen that there is herein provided a new and improved upholsterer's pneumatic tack hammer device and continuous tack feeder system which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

It is to be understood, of course, that the foregoing disclosure relates to preferred embodiments of the invention as illustrated, that various modifications and changes may be made in the invention by those skilled in the art without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A pneumatic tack hammer and continuous tack supply mechanism therefor comprising in combination, a tack supply hopper, a magnetic tack conveyor extending therefrom, an inclined vibrating tack sorting trough, means for brushing tacks from said conveyor onto said trough, a tack positioning tube fed by gravity from the lower end of said trough, said tube being of inverted T shaped cross sectional configuration whereby said tacks are positioned head down, a sleeve communicating with said tube, a gate intermittently openable to pass tacks to said sleeve in head first position, a solenoid for actuating said gate, a pneumatic tack driving gun having a barrel and a tack inverter adjacent said barrel, a flexible tube connecting said sleeve and said tack inverter, pneumatic means for supplying air to said sleeve to force tacks through said flexible tube and said inverter into said barrel in point first relation, spring biased dogs for aligning a tack in said barrel, pneumatically operated piston means driving said tack into an adjacent substance, and magnetic means holding a tack head against the end of said piston.

2. The structure of claim 1 wherein said tack inverter includes a downwardly curved tube, an obtuse angled depression in the bottom surface thereof, and a slot for inverting tacks into a point first position for being driven into a work material.

3. The structure of claim 1, wherein said tack inverter comprises a tack engaging arcuate surfaced protuberance adjacent a restricted slotted area of said flexible tube therein adapted to feed tacks into said barrel with the sharp end forward for ejection from said gun into a work material.

4. The structure of claim 3, wherein said pneumatic gun includes a conical tack director at the end of said barrel to direct a tack in a straight forward longitudinal relationship into desired work material.

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