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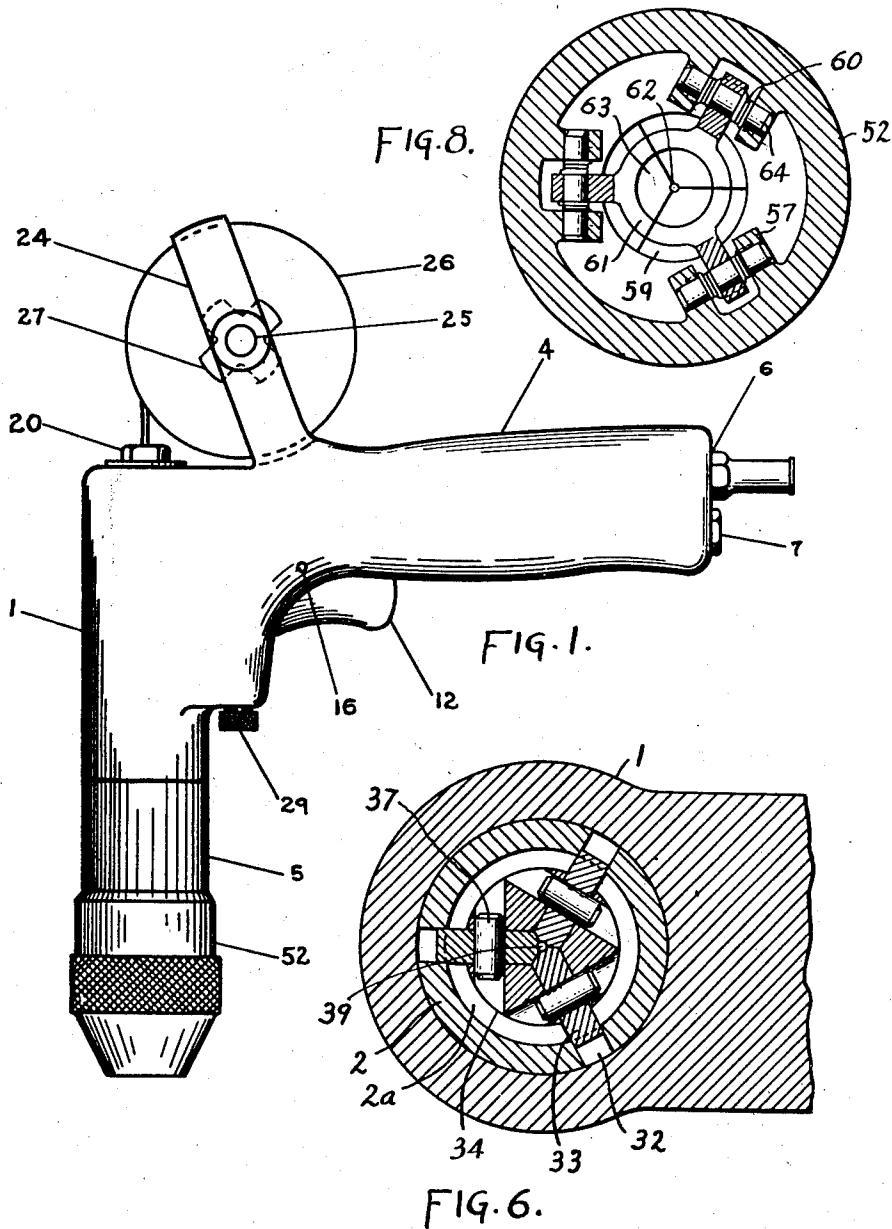
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2,421,474

PNEUMATIC NAILING HAMMER

Filed May 4, 1944

4 Sheets-Sheet 1



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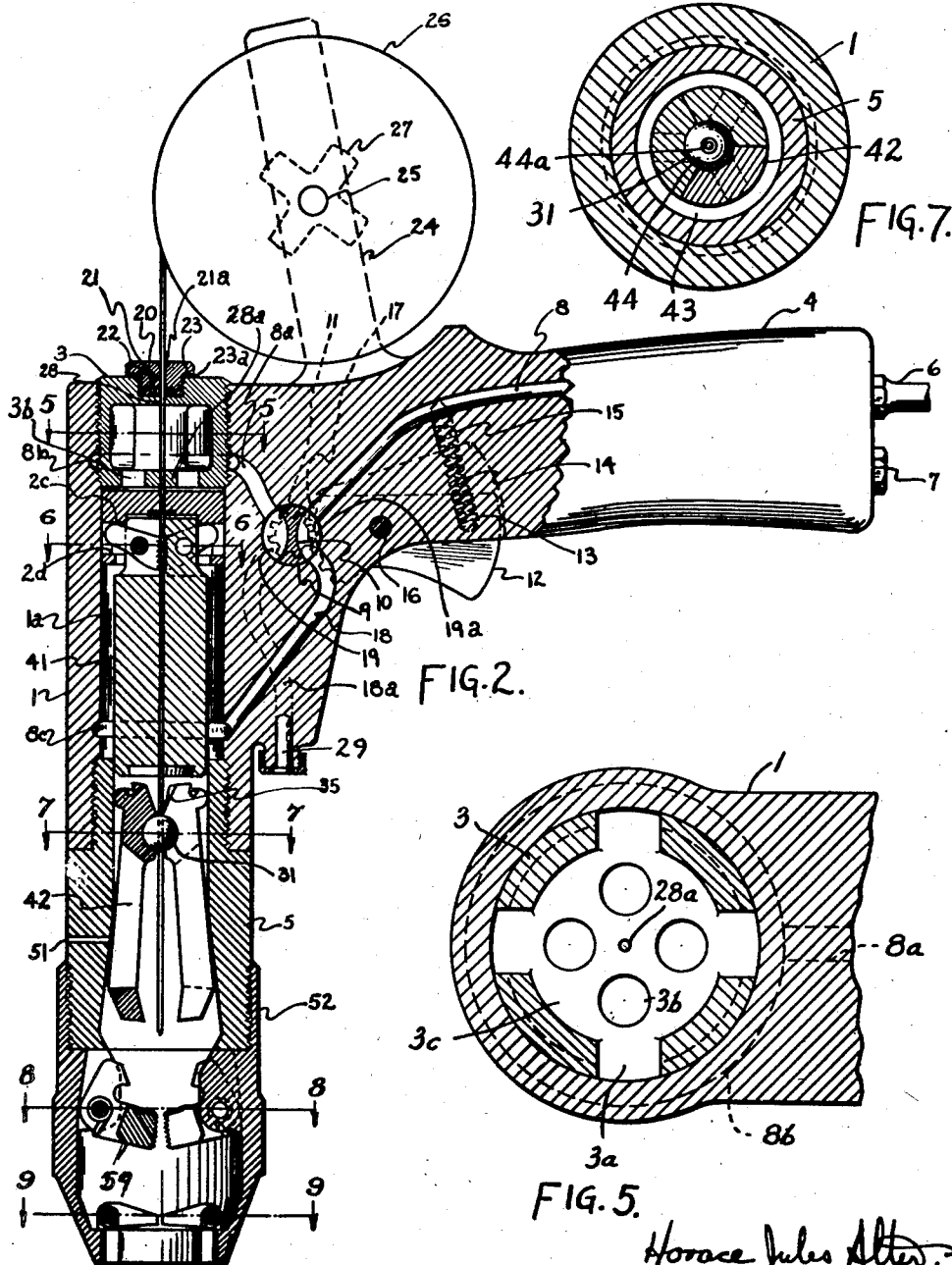
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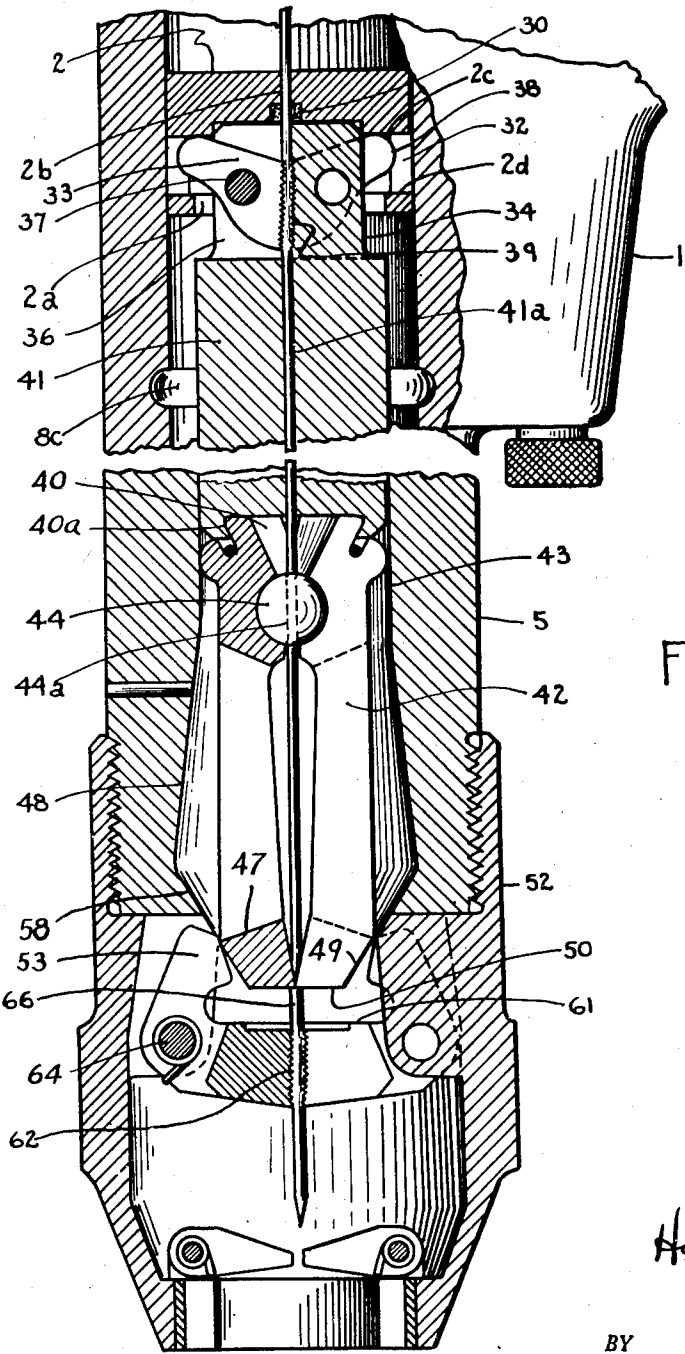
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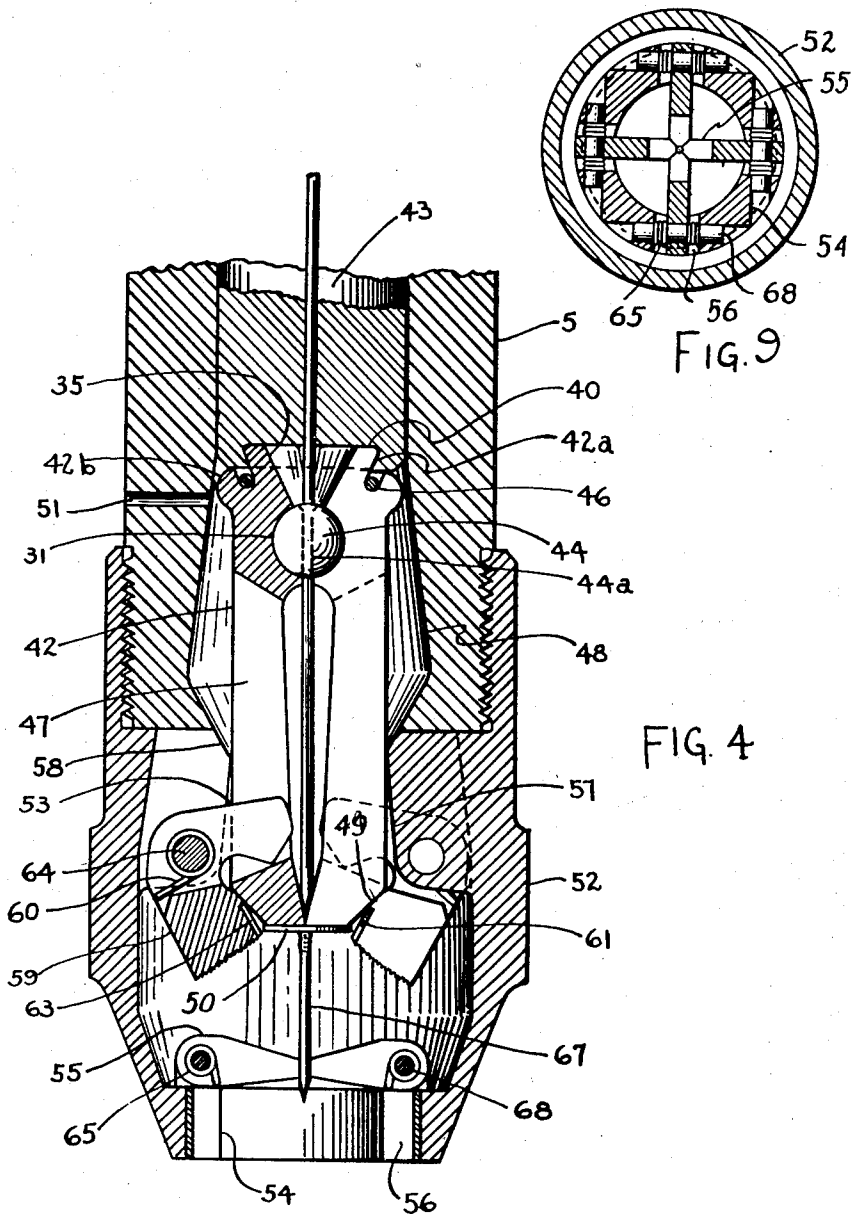
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UNITED STATES PATENT OFFICE

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PNEUMATIC NAILING HAMMER

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Application May 4, 1944, Serial No. 534,061

10 Claims. (Cl. 1—51)

1

This invention relates to a fluid pressure tool and in particular to a pneumatic nailing hammer or nailing tool which has for its primary object the provision of a device for forming a nail, brad, or tack and driving said nail, brad, or tack into wood, plastic, paper, cloth, metal, or other materials.

One object of this invention is the provision of a tool wherein a nail is cut, pointed and headed in a continuous operation by means of fluid pressure.

Another object of this invention is the provision of a tool which will hold the nail while it is being driven into the materials that are to be fastened together.

Another object of this invention is the provision of a light portable tool wherein all materials and means for forming and driving a nail are self-contained.

A further object of this invention is the provision of a tool whereby a continuous supply of nails will be formed from a spool of wire by means of fluid pressure, said nails being made and driven into the materials to be fastened during a complete cycle of operation of the tool.

A further object of this invention is to provide a tool for cutting, pointing, positioning, and driving wire nails by means of a self-contained mechanism utilizing fluid pressure to perform the operations, said tool being capable of manufacturing nails of different length by adjusting means in said tool.

A still further object of this invention is to provide a tool, fluid pressure driven, whereby an assembly of parts and a fastening of parts, by means of nails, may be made a continuous and time saving operation by having materials for making a nail and apparatus and mechanism for making and driving said nail all combined within a portable hand tool.

Still further objects of this invention are to provide a fluid pressure operated nailing device which will eliminate the use of the hands to hold a nail while driving same into place by means of a hammer or mallet and to provide a tool for making and driving nails, said tool not requiring dexterity and strenuous exertion on the part of the operator in driving nails, brads, or tacks into materials which are to be fastened together. Objects pertaining to economics of construction, speed of operation and promotion of safety by eliminating the hazards incidental to the driving of nails by use of a hand held hammer will appear from the detailed description to follow.

With these and other objects in view, this in-

2

vention consists in certain new and novel features of construction, combination and arrangement of parts and mechanisms which are to be more fully described and claimed hereinafter.

For a complete understanding of my invention, reference is to be had to the following description and the accompanying sheets of drawings wherein I have illustrated a tool embodying my invention in its preferred form and combination of parts.

Figure 1 is an elevation illustrating a pneumatic nailing hammer constructed in accordance with my invention.

Figure 2 is a vertical sectional view illustrating the same and showing the position of the parts at the start of a cycle of operation.

Figure 3 is a fragmentary vertical sectional view showing the cutters in the process of cutting off a length of wire to form a nail point and head.

Figure 4 is a fragmentary vertical sectional view showing the nail in the process of being driven into the materials to be fastened.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a sectional view taken on the line 6—6 of Figure 2.

Figure 7 is a sectional view taken on the line 7—7 of Figure 2.

Figure 8 is a sectional view taken on the line 8—8 of Figure 2.

Figure 9 is a sectional view taken on the line 9—9 of Figure 2.

Referring in detail to the drawings, the pneumatic nailing hammer comprises a cylinder body 1 constructed of metal, plastic or some other suitable composition of materials and having a bore 1a adapted to receive a piston 2. Said body is preferably of the shape as shown with a handle to permit the tool to be readily grasped at the upper end but, may be modified by suitable arrangement of parts to eliminate the handle allowing the hammer to be grasped by the cylinder body or by means of a spade or T-shaped handle.

The upper end of the cylinder body is recessed and internally threaded to receive an externally threaded cylinder head nut 3, said nut serving as a closure for the upper end of the piston chamber and as a means for regulating the stroke of the piston whereby, the length of nail is controlled. The cylinder body is internally threaded at its lower extremity and shouldered to receive and abut an externally threaded cutter cam body 5.

The grip handle 4 is preferably an integral part of the cylinder body and has an inlet fluid passage 8 internally threaded at 6 to receive a fitting

3

suitable for attachment to a fluid pressure supply line. A relief valve for by-passing the fluid and relieving the pressure when dangerous peaks are reached is incorporated in the handle at 7 and connected to the fluid pressure passage 8 in the usual manner.

In the preferred form of my invention, connection is provided between the inlet fluid passages 8 and 8a and the exhaust passages 18 and 18a by a rotary valve 10, rotatable in a cylindrical bore 9 and having a gear 11 engageable with a rack 17 to control communication between inlet passages 8 and 8a and exhaust passages 18 and 18a. It is to be understood that the valve may be modified to be of a slidable, poppet, ball, or diaphragm type by suitable rearrangement and construction of the handle without changing the scope of the invention or its purpose.

Adjacent to the valve and operating within a recess cut within the handle is the valve trigger 12 pivotally mounted on pin 16 and having a bore 13 for retaining a trigger spring 14 which contacts with the handle, said spring being retained in said handle by the bore 15.

The cylindrical shaped rotary valve has cut therein grooves 19 and 19a which serve to connect respectively fluid inlet passages 8 and 8a and fluid exhaust passages 18 and 18a and communicate said passages with the circumferential passages 8b and 8c cut within the walls of the cylindrical body and with the exhaust port 29.

Attached to the handle are arms 24 extending vertically and forming a support for the spindle 25, said spindle being inserted through the spool 26 containing the wire for forming the nails. A plurality of tension spring 27 or a similar means of braking the spool, preventing said spool from turning freely and unwinding the wire, are inserted between the support arms and the spool.

The wire for forming the nails passes through a gland nut 20 which is externally threaded and has a central bore 21 and a counterbore 21a. Said nut has a shoulder 23 under which, is placed a gasket 23a abutting the cylinder head nut 3. The gland nut is recessed, at the lower face, to receive a packing 22 thus keeping the connection between the gland nut 20 and the cylinder head nut 3 substantially fluid tight.

The cylinder head nut 3 is externally threaded to engage with the cylinder body 1. Movement of the nut downward into the cylinder body shortens the length of piston stroke whereby the length of nail is shortened. Turning the nut outwardly lengthens the piston stroke whereby the nail is lengthened. The cylinder head nut is internally threaded at the upper end to receive gland nut 20 and has central bores 28 and 28a, (Figs. 1 and 5) the wire for forming the nail, extending through said bores. A plurality of communicating ports 3a cut vertically through the side walls of the cylinder head nut and registering with the circumferential passageway 8b communicates said passageway with the hollow chamber 3c cored out of the cylinder head nut (Fig. 5). A plurality of ports 3b cored in the lower surface of said cylinder head nut lead from the hollow chamber to the interior of the cylinder.

The piston 2 (Fig. 3) slidably supported within the cylinder bore 1a has a large central cavity 2a and a central bore 2b, the wire for forming the nail extending through said bore. The lower surface of the piston head is counterbored around the central bore to receive a packing gland 30, said gland substantially preventing leakage of fluid pressure through the central bore of the

4

piston. The vertical face or skirt of the piston has cut therein a plurality of elongated slots 32 engageable with the cranked tongs 33 thereby holding and positioning the hammer head extension 34 within the piston cavity 2a. The depth of the cavity and length of the slots are sufficient to allow vertical movement of the hammer head extension 34 and tongs 33 within the piston cavity and slots respectively.

The hammer head 41 is cylindrical in shape, the upper extremity 34 being of reduced diameter and having a plurality of vertical grooves 36 extending from the center. A central bore 41a extending throughout the length of said hammer head allows the wire for forming the nail to pass therethrough. A plurality of tongs 33 preferably three or four in number are rotatably pivoted in the slotted grooves 36 by means of pivots 37.

The upper ends of the tongs are rounded and bear on the shoulders 2c or the shoulders 2d respectively (Fig. 3). The portions of the tongs forming the wire bore 39 and centrally located thereabout are serrated or knurled for effecting gripping of the tongs into the wire when pressure is downwardly applied to the tong ends 38 by shoulders 2c.

The lower extremity of the hammer head (see Fig. 4) has an outwardly tapering or dovetail recess 40 centrally located about the wire bore to receive the tapering shoulders 42a of the cutters 42.

The cutters 42 preferably three or four in number are slidably supported within the central bore 43 of the cutter cam body 5. The upper extremities of the cutters form an outwardly tapering extension 42a of reduced diameter which is engageable with the recess 40 of the hammer head. The upper portion of the cutters has a rounded shoulder 42b of maximum diameter, said shoulder forming a slidable bearing for the cutters and the upper surface of said shoulder recessed to receive a ring spring 46 for holding the cutter jaws outwardly against the cutter cam body walls. The upper extremity of the cutters has a central inwardly tapering bore 35 leading to a spherical bore 31, said spherical bore receiving the cutter fulcrum 44.

The cutter fulcrum is spherical in shape, said fulcrum having a central bore 44a, ends of said bore countersunk and the wire for forming the nail passing through said bore.

A central cavity extends vertically through the cutters from the fulcrum to the lower extremity of the cutters forming the interior of the cutter arms 42, said arms having vertical slots 47 to slidably engage anvil cranks 53. The interior surfaces are tapered inwardly at the lower extremity of the cutter arms to form the cutting edges 50 while the lower exterior surfaces are tapered outwardly to form the cam surfaces 49.

The cutter cam body 5 is preferably cylindrical in shape having a large central bore 43 in the upper portion extending to an outwardly tapering bore in the lower portion and thence tapering inwardly again at the lower extremity to form the cutting cam sliding surface 48. Said cutter cam body is externally threaded to receive and abut the cylinder body 1 positioning the cutter cam bore 43 centrally about the hammer head 41. The cutter cam body is externally threaded at the lower extremity to engage with the anvil holder 52. A plurality of ports 51 permit the air trapped within the cutter cam bore to escape to the surrounding atmosphere.

5

6

The anvil holder 52 is preferably cylindrical in shape and tapering at the lower end to permit tool access to corners and close edges. Said holder is internally threaded at the upper end to receive the cutter cam body 5 and has as an integral part or attached thereto a plurality of brackets 57 preferably three or four in number equally spaced about the central bore of the anvil holder, said brackets forming a support for a plurality of anvils 59 by means of the pivot pins 64. The lower extremity of the anvil holder is cored to receive a cylindrical housing or bushing 54, said bushing forming a supporting means for the positioning arms 55.

The upper extremity of the anvil holder 52 has a cam surface 58 (Fig. 4) which mates and aligns with the cam surface 48 of the cutter cam body 5, said cam surface providing a sliding means for the cutters. The outer circumference of the holder is knurled to permit better gripping of the anvil holder.

The anvils 59 preferably three or four in number are rotatably supported in the anvil holder brackets 57 and are retained in an upright position by means of the anvil springs 60. The anvil segments 61 form a platen having a central bore 62 (Fig. 3), the perimeter of said bore being serrated to form a wire gripping means. The upper surface of said platen has a counter-bore 63 for forming the nail head. A plurality of bell cranks 53 extend upward from the anvil segments forming levers and cams against which the cutters are in slidable contact.

The positioning arms 55 preferably three or four in number, are mounted in the positioning arm holder 54 by means of pivots 68 and are retained in an upright position by springs 65. The positioning arm holder has a plurality of vertical slots 56 equal to the number of arms, said arms folding downward into said slots when the cutters move downward past the positioning arms. The arms are tapered downwardly along the upper surface.

Although the foregoing description is of a detailed character, to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining since it is to be understood that rearrangement of parts and modification of structural details may be made without departing from the scope or purpose of the invention as herein claimed.

In explaining the operation of this invention, let it be assumed that a spool of wire has been inserted between the forked arms 24 and a length of wire has been threaded through the central bores of the pneumatic nailing hammer down to the cutting edges 50. Let it also be assumed, that the cylinder head nut 3 has been adjusted to cut a nail of a given length and that the valve trigger 12 and valve 10 are in the closed position shown in Figure 1. The piston occupies the position at the top of the cylinder or beginning of its stroke. At this time, pressure is transmitted from the inlet fluid pressure duct 8 through the valve passage 19a, through the passage 18 and the annular groove 8c to the bottom of the piston chamber 1a thereby exerting pressure on the bottom of piston 2 holding it at the upper end of the cylinder.

Holding pressure escaping between the piston and cylinder walls toward the top of the piston, passes out through the ports 3b into the hollow chamber of the cylinder head nut, through the annular groove 8b to the passage 8a and exhaust-

ed through passage 18a and exhaust port 29 to the atmosphere.

As the operator presses the trigger 12, he actuates the rotary valve causing passages 19 and 19a to communicate with passages 8 and 8a and 18 and 18a respectively thereby cutting off the supply of holding pressure to the bottom of the piston and admitting live pressure through passage 8a, annular groove 8b and into the cylinder head nut chamber 3a. The full force of the pressure building up behind the piston by flow through ports 3b causes the piston to move downward thus forcing the piston shoulders against the rounded shoulders 38 of the tongs 33. Further downward movement of the piston causes rotation of the tongs about the pivots 37 forcing the serrated jaws 39 into the wire in a gripping motion.

The continued building up of pressure moves the piston downward forcing the hammer head assembly consisting of tongs 33 and hammer head 41 to move downward in the cylinder bore 1a. Since the tongs 33 have gripped the wire in the serrated jaws 39, the wire is pulled along downward through the central bores 28 and 21 of the cylinder head nut and gland nut respectively and pushed on downward past the cutting edges 50.

The piston and hammer head assembly continue to move downward until the inner face of hammer head dovetail recess 40 contacts the tapering cutter shoulders 42a thus forcing the cutters downward. The piston, hammer head assembly, and cutters continue to move downward under fluid pressure pushing the wire on downward and into the central bore 62 of the anvils. The movement forces the cutters 42, which are held against the walls of the cutter cam body 5 by action of the spring 46, to slide along the bore 43 to the cutter cam body sliding surfaces 48. Downward movement along the surface 48 and 58 forces the cutters 42 to rotate about the cutter fulcrum 44 bringing the cutting edges 50 (see Fig. 3), together and shearing off a length of wire at the same time forming a new nail point on the wire immediately above the sheared section. It may be seen that the length of nail cut may be adjusted by lengthening or shortening the piston stroke. Moving the cylinder head nut 3 upward or downward within the threaded cylinder body 1 will determine the length of the stroke of the piston, hammer head assembly and cutters.

At the same time that the cutters are closed, the upper extensions 42a are forced outward and locked in the recess 40 provided in the hammer head 41. The hammer head and cutters are then locked together as a unit and move in unison with the piston.

During the downward stroke, a length of wire has been pushed past the cutters 42 and through the central bore 62 of the anvils 59 and is retained there by the anvil platens 61 under pressure of the springs 60. There is then a length of wire sufficient to make a nail retained in the anvils, with a short length of wire 66 extending above the anvil recess 63 (see Fig. 3).

Further downward movement of the piston, hammer head assembly and cutter units rotate the anvil cranks 53 outwardly about the pivots 64 causing the anvils to firmly grip the length of wire in the bore 62 thereby, preventing further movement of the wire. The continued downward movement of said units under the fluid pressure, causes the closed cutter face, adjacent to the edges 50, to exert pressure on the short length of wire extending above the anvil platens. Under the pressure, applied by the cutter face, plastic

7

flow of the wire material results, causing the excess of wire material 66 above the anvil platen 61 to upset and flow into the recess 63. A nail head is thus formed.

Still further downward movement of the said units causes the cutters face to contact the face of the anvil platens, at the same time aligning the vertical slots 47 of the cutters with the anvil cranks 53, whereby, the anvils are forced to rotate about the pivots 64 causing the anvil cranks to enter into the vertical slots 47 thereby releasing the nail 67 from the gripping bore 62 (see Fig. 4). The downward motion of the piston, hammer head assembly and cutters pushes the nail into the positioning arms 55 holding the nail in appropriate position for driving.

Continued movement of said units forces the nail 67 into the materials to be nailed together by action of the cutters face on the nail head. The cutters moving down and past the positioning arms 55 causes them to rotate about the pivots 68 and forcing them downward and outward into the recesses 56. The units continue to move downward until the nail is driven home, thus completing that portion of the cycle incidental to making and driving a nail.

As the trigger is released, under spring pressure, it actuates the rotary valve causing passage 8a to communicate with 18a and passage 8 to communicate with 18 thereby cutting off the supply of fluid pressure to the top of the piston and admitting live pressure fluid through passage 18 and annular groove 8c to the bottom of the piston thereby, forcing the piston upward. The piston moves upward until the shoulder 2d contacts the underside of the tong ends 38 thereby causing the tongs to rotate upward and outward about the pivots 37 thus releasing the wire. The shoulder 2d abutting the tong ends 38 causes the piston, hammer head assembly and cutters to move upward in unison pushing the wire backward and upward by means of the closed cutter jaws. As the cutters move upward past the positioning arms 55, said arms rotate inwardly and upwardly under action of the spring 65 causing the arms to assume their initial position.

Further upward movement of the assembly past the anvils allows the anvils to rotate about the pivots, upwardly and inwardly, under action of the springs 60 whereby, the anvils are caused to assume their initial closed position.

Still further upward movement of the units draws the cutters upward until the jaws are rotated outwardly about the fulcrum 44, under action of the ring spring 46, into the tapered bore of the cutter cam body 5. This releases the wire which is no longer pushed upward by the closed cutters but, is held stationary by friction of the various glands and packings as well as the wire spool brake.

Continued upward movement and the outwardly opening movement of the cutters releases outwardly tapering extensions 42a of the cutters 42 from the hammer recess 40 permitting the cutters to remain in the cutter cam body 5. The upward movement of the piston and hammer head assembly continues until the piston reaches the top of the cylinder at which time, the cycle is completed.

While the invention has been particularly described with reference to the illustrated embodiment, it will be apparent that many forms and adaptations thereof may be made within the operation, purpose and scope of the invention.

8

Having thus described my invention and its operation, what I claim is:

1. A fluid pressure operated tool for making and driving fasteners comprising a casing formed with a bore; means for holding a supply of wire on the casing; a pressure operated plunger reciprocable in the bore; means engageable with the plunger for drawing wire from the supply and feeding it forwardly; a hammer, operated by the plunger; cutters, slidable within the casing and operated by the hammer, for severing a strip of wire; means for pivoting the cutters during their sliding movement to cause them to point the leading end of each successive strip of wire; and means, coacting with said cutting and pointing means, for swaging the trailing end of the strip to form a head thereon and provide a complete fastener, said cutting and pointing means being operated by the hammer to drive the headed fastener from the tool and into the work.

2. A fluid pressure operated tool for making and driving fasteners comprising means for holding a supply of wire; means for advancing the wire in predetermined increments; means for severing the wire angularly to provide strips having pointed ends; means for holding the strips as they are cut individually from the supply; means, coacting with said holding means and cutting means to form heads on the trailing ends of the strips to provide fasteners; means for driving the fasteners from the tool and into the work; a casing for enclosing the several above named means; and a fluid pressure operated plunger, reciprocable within the casing, said plunger having means for actuating the wire-advancing, severing, heading and driving means.

3. A fluid pressure operated tool for making and driving nails comprising a casing provided with a bore; means for holding a supply of wire on the casing; a fluid pressure operated plunger reciprocable in the bore; means operated by and movable with the plunger for feeding wire from the supply during movement of the plunger in one direction and released from the wire when the plunger is moved in the opposite direction; a hammer slidable in the bore; means operated by the hammer for angularly severing the fed wire in strips of predetermined length and pointing the leading end of successive strips; and means coacting with and operated by the severing means for heading the trailing ends of the strips to form complete fasteners, said severing means being operated by the hammer to drive the fasteners individually from the tool and into the work.

4. A fluid pressure operated nail making and driving tool comprising a casing having a bore; means for holding a supply of wire on the casing; a plunger reciprocable in the bore; means for admitting fluid under pressure into the bore to actuate the plunger; means actuated by the plunger for drawing wire from the supply and feeding it forwardly; a hammer actuated by the plunger; means actuated by the hammer for simultaneously severing a strip from the advanced wire and pointing the leading end of the successive strip; and means, coacting with the severing means, for swaging the opposite end of the strip to form a head on the wire; further sliding movement of the severing means causing it to drive the nail from the tool and into the work.

5. A fluid pressure operated nail forming and driving tool comprising a casing having a bore; a plunger within the bore; means for selectively admitting fluid under pressure to either end of the bore to move the plunger in opposite direc-

tions; means for holding a supply of wire on the casing with its leading end positioned within the bore; means actuated by the plunger for feeding the wire from the supply; means for adjusting the stroke of the plunger to control the length of wire fed forwardly; means for holding the fed length of wire; a hammer actuated by the plunger; cutters, actuated by the hammer, for severing a strip of wire from the fed length; means for pivoting said cutters as they are slid longitudinally to form a point on the leading end of each successive wire strip, said cutters coacting with the wire holding means to form a head on the trailing end of the strip to complete the formation of a nail; and to finally drive the nail into the work; and means for guiding the nail during the driving operation.

6. A portable fluid pressure operated nail making and driving tool comprising a casing formed with a bore; a plunger within the bore; means for selectively admitting fluid under pressure to the ends of the bore to move the plunger in either direction; a manually-operable valve for controlling the flow of fluid to the bore; means for holding a supply of wire on the casing; pivoted jaws, actuated by the plunger and engageable with the wire leading into the bore; said jaws being adapted to feed the wire when the plunger is moved forwardly; means for adjusting the stroke of the plunger to control the length of wire fed forwardly; a hammer actuated by the plunger; pivoted cutters operated by the hammer to sever a strip of wire from the advanced length, said cutters acting to point the leading end of each successive strip during the severing operation; and means, co-operating with the cutting means, for forming the trailing end of each strip into a head to complete the formation of a nail, said cutting means being operative to drive the nail into the work following its formation.

7. A portable fluid pressure operated nail making and driving tool comprising a casing formed with a bore; a plunger reciprocable in the bore; means for admitting fluid under pressure to the ends of the bore to move the plunger in either direction; means for holding a supply of wire on the casing with its leading end arranged within the bore; a hammer slidable in the bore; jaws pivoted on the hammer and forming a driving connection between the plunger and hammer, said jaws being engageable with the wire to feed the latter when the plunger is moved forwardly; means for adjusting the stroke of the plunger to vary the length of wire advanced; jaws pivoted within the casing for holding the length of wire advanced, said holding jaws being provided with recesses; means actuated by the hammer for simultaneously severing successive wire strips of predetermined length after pointing their leading ends, said means forcing their trailing ends into recesses of the holding jaws to upset a head thereon and subsequently driving the completed nail into and means for guiding the nail during the driving operation.

8. A portable fluid pressure operated nail making and driving tool comprising a casing formed with a bore; a plunger reciprocable within the bore; means for admitting fluid under pressure to the ends of the bore to move the plunger in either direction; means for holding a supply of wire on the casing with its leading end arranged within the bore; a hammer slidable within the bore; means on the hammer interconnected between the hammer and plunger for feeding the wire forwardly; means for adjusting the stroke

of the plunger; a plurality of floating cutters within the casing actuated by movement of the hammer; recessed jaws pivoted within the casing for holding the advanced length of wire; cam means for pivoting the cutters during the forward stroke of the hammer to cause them to simultaneously sever and point successive strips of wire, said cutters coacting with the holding jaws to swage the trailing end of each strip into the recesses thereof to form a complete nail and adapted to thereafter drive the nail into the work; and a plurality of pivoted members within the casing for guiding the nail during the driving operation and releasing the nail after its pointed end has penetrated into the work.

9. A power operated tool for forming and driving wire nails comprising a casing having a longitudinal bore; means attached to the casing for holding a supply of wire, a plunger slidable within the bore; a hammer also slidable within the bore and formed with a recessed end; wire feeding elements pivoted on the opposite end of the hammer and engageable with the plunger to connect the hammer for actuation by the plunger, said elements being adapted to grip and feed a length of wire forwardly within the casing; a plurality of pivoted cutters movable longitudinally within the bore, said cutters being provided at one end with means engageable in the recess of the hammer during part of the sliding movement of the latter and with inclined cutting edges at their opposite end; resilient means for normally holding the cutters in open relationship to permit the wire to be fed forwardly between the cutting edges; a cam formation within the casing for pivoting the cutters during their forward movement to cause their inclined ends to simultaneously sever a strip from the advanced wire and point the leading end of the successive strip; a plurality of elements pivoted within the casing and operated by the inclined ends of the cutters to grip and hold the leading portion of the advanced wire during the cutting operation, said holding elements co-operating with the cutters during further longitudinal movements of the latter to upset the trailing end of the strip to form a head, thus making a complete nail; means for pivoting the elements in the opposite direction, following the nail forming operation, to cause them to release the nail; and a plurality of elements pivoted within the casing for guiding the nail during the driving of the latter into the work by the cutters.

10. A power operated tool for forming and driving fasteners comprising a casing having a longitudinal bore; means attached to the casing for holding a supply of wire; a plunger slidable in said bore; a hammer also slidable in the bore and formed with a recessed end; wire feeding elements pivoted on the opposite end of the hammer and engageable in openings in the plunger to connect the hammer for actuation by the plunger, said elements acting to feed a length of wire forwardly within the casing; means for adjusting the stroke of the plunger to predeterminedly control the length of wire fed by the elements; a plurality of cutters pivotally joined together to form a unit slidable within the bore, said cutters being provided with means at one end engageable in the recess of the hammer during part of the stroke of the latter and with inclined cutting edges at their opposite ends; a spring for normally holding the cutters open to permit the wire to be fed forwardly between their cutting edges; a plurality of angular elements pivoted within the casing and formed with co-

11

operating serrated edges for gripping and holding the length of wire advanced by the feeding elements, said holding elements being operated by the inclined ends of the cutting means during the cutting operation; a cam, stationary within the casing, engageable with the inclined ends of the cutters during the forward sliding movement of the latter to cause their cutting edges to move inwardly toward one another to simultaneously sever a strip from the advanced wire and point the leading end of the successive strip; longitudinal openings in the cutters, said cutters being movable beyond the cutting position and relative to the wire strip held by the holding elements to swage the trailing end of the strip thus forming a head thereon and to thereafter pivot the holding elements with portions thereof entering the openings in the cutters thus releasing the formed nail; and a plurality of elements pivoted in the casing and co-operating to form a guide-

12

way therebetween through which the nail is driven by the cutters during continued movement of the latter.

HORACE JULES ALTER.

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