Aug. 8, 1961 C. P. WILLIS 2,994,880

UPHOLSTERER'S PNEUMATIC TACK DRIVING HAMMER

Filed April 8, 1960 4 Sheets-Sheet 1

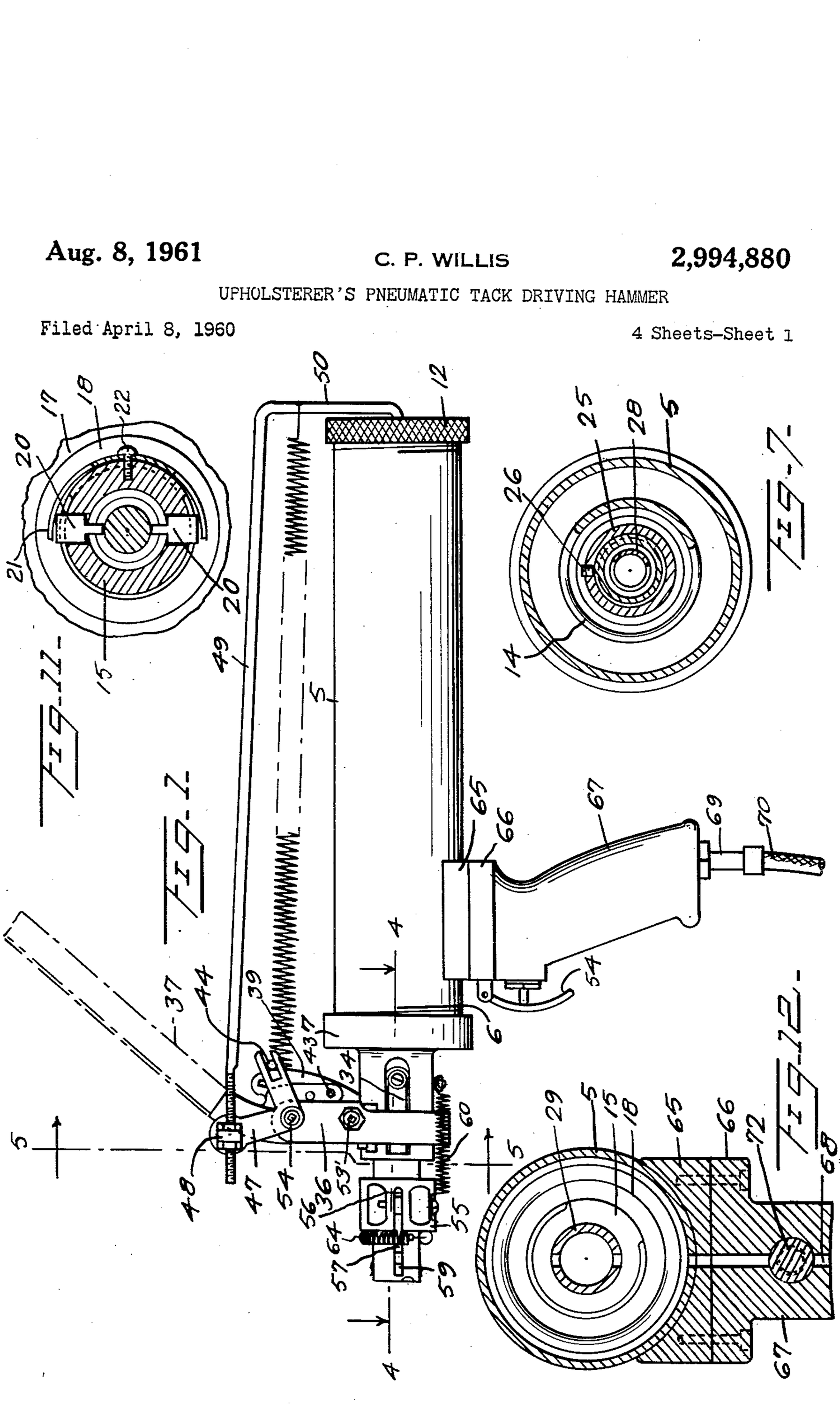

FIG. 11

FIG. 7

FIG. 12

C. P. WILLIS
INVENTOR
BY C. A. Snow & Co.
ATTORNEYS

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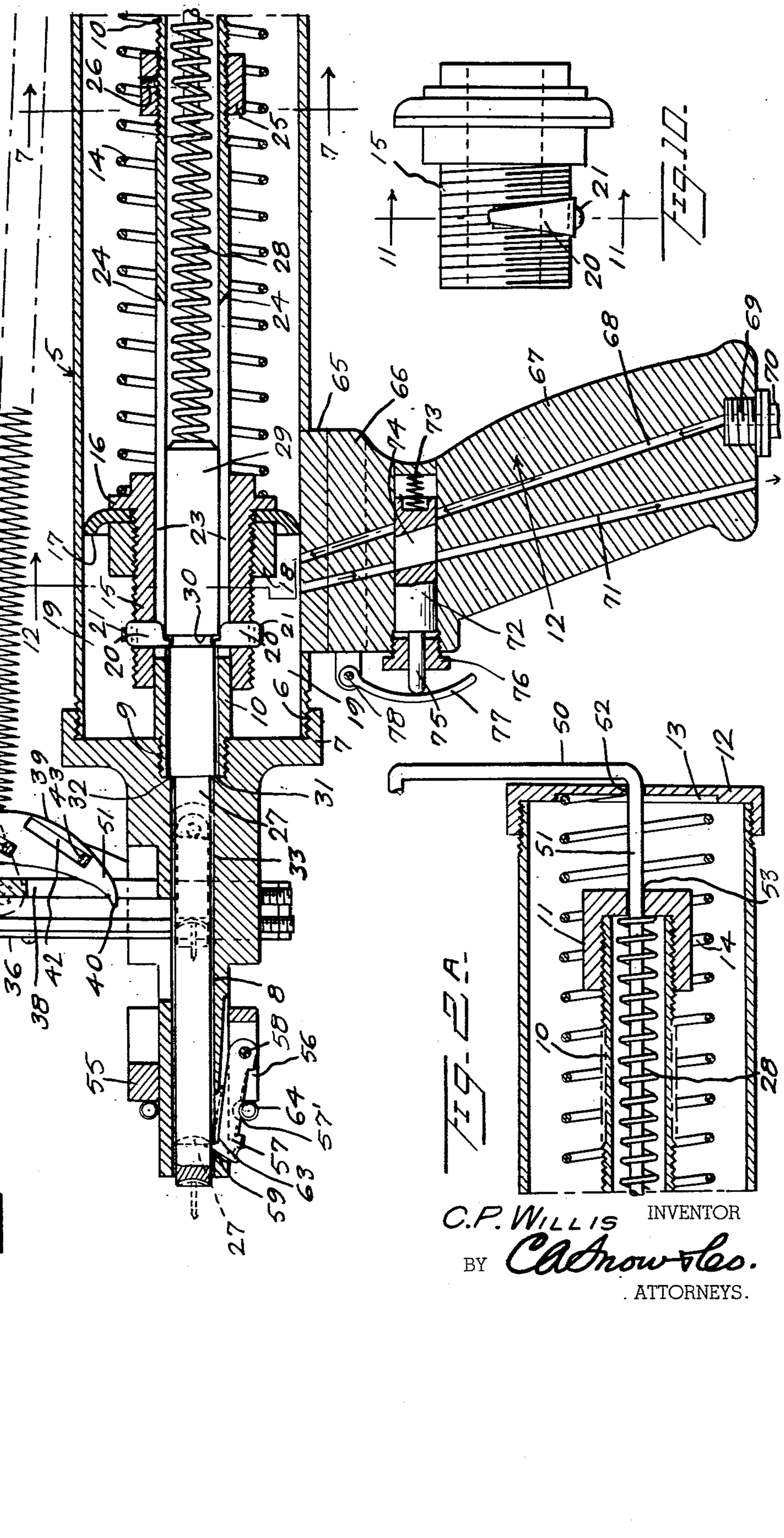

FIG. 2.

FIG. 4.

C. P. WILLIS INVENTOR

BY C. A. Snow & Co.

ATTORNEYS.

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UPHOLSTERER'S PNEUMATIC TACK DRIVING HAMMER

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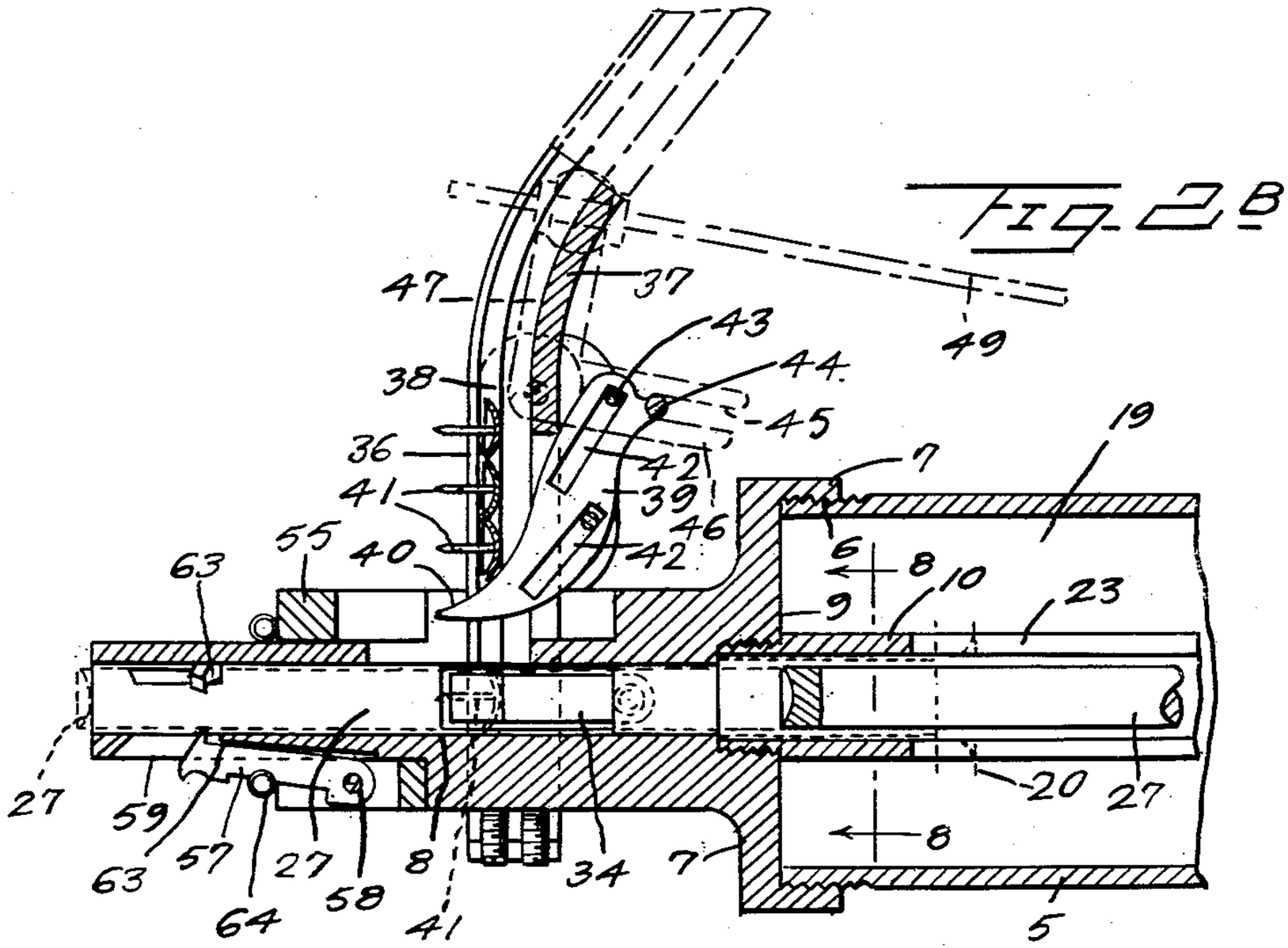


Fig. 2B

Fig. 1B.

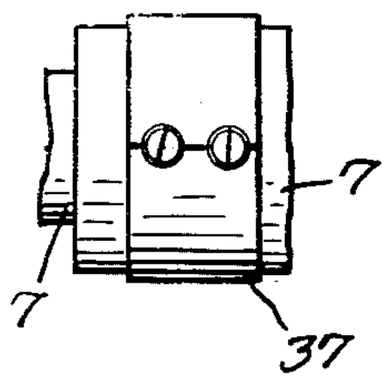
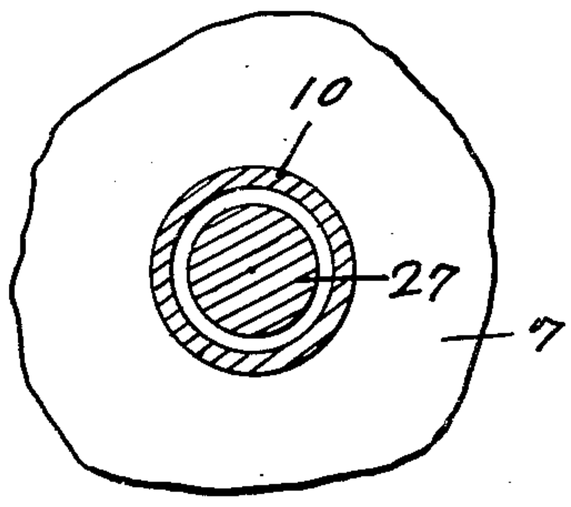


Fig. 8.



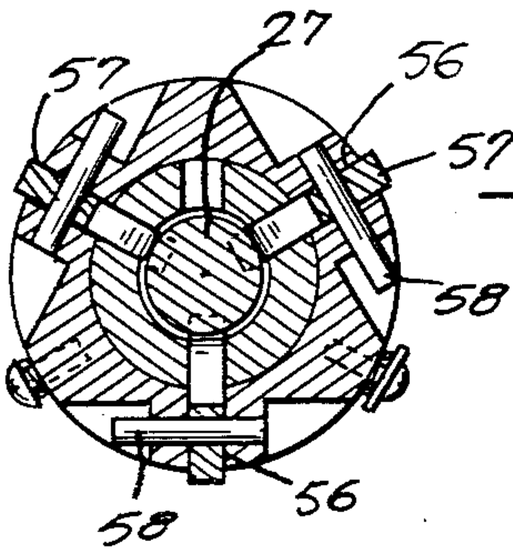


Fig. 6.

C. P. WILLIS
INVENTOR
BY C. A. Snow & Co.
ATTORNEYS.

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FIG. 3.

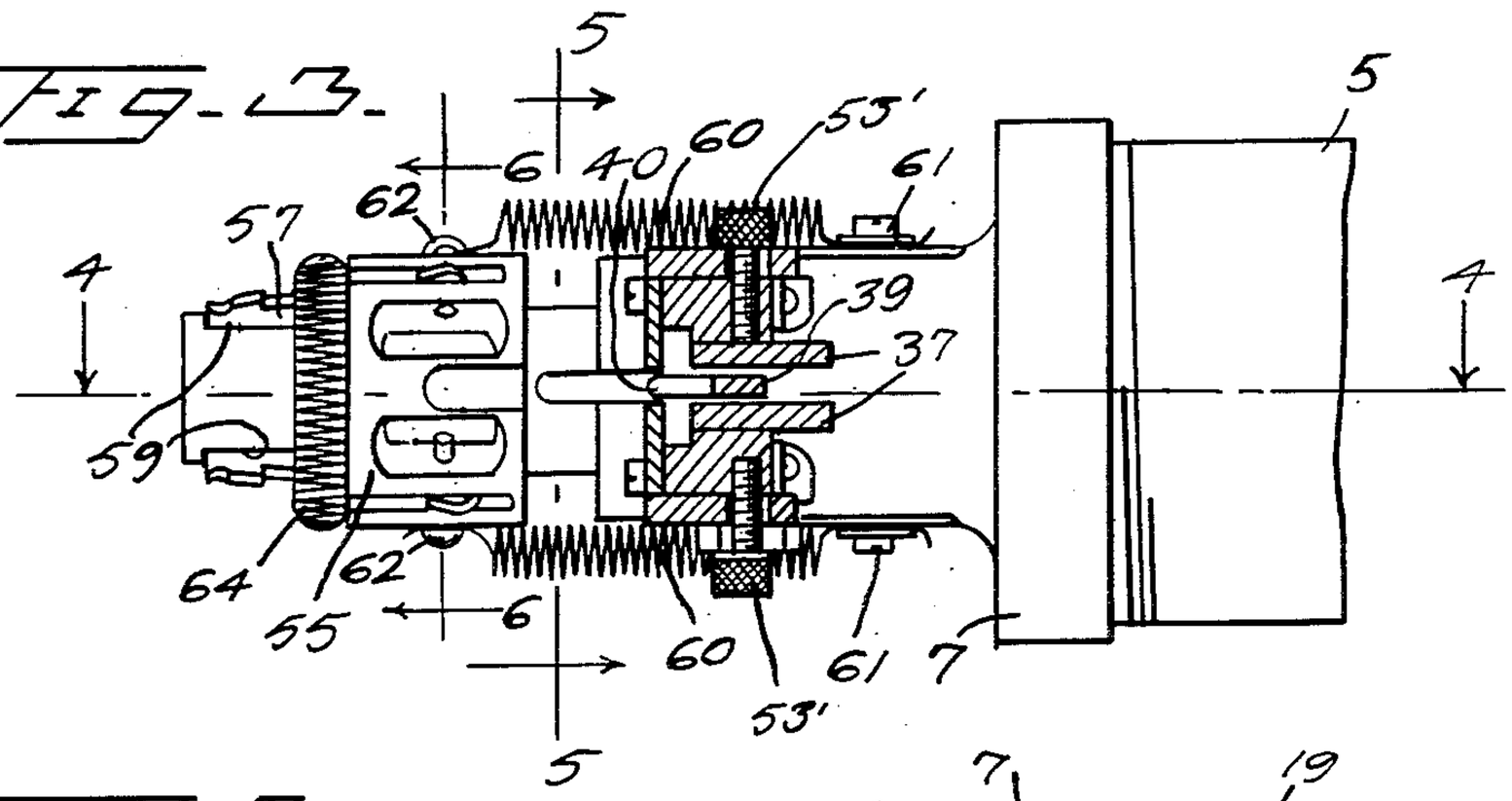


FIG. 4.

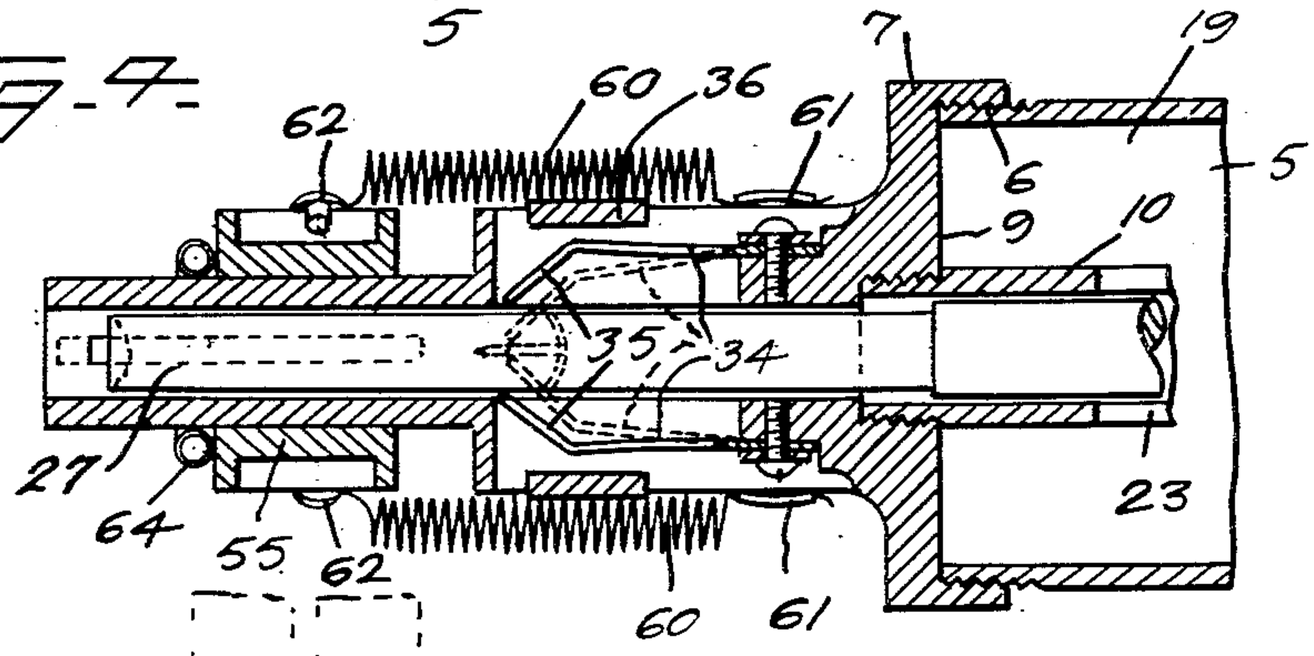


FIG. 5.

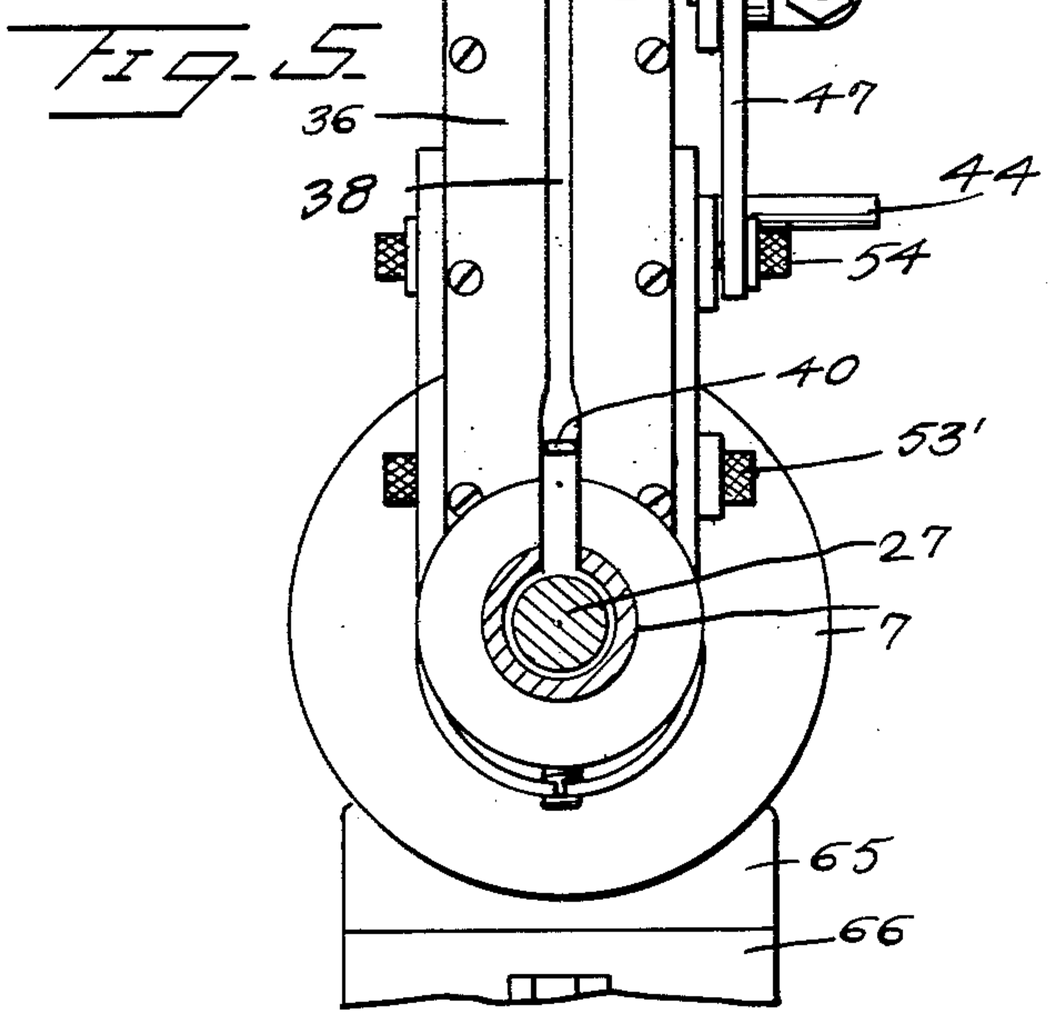
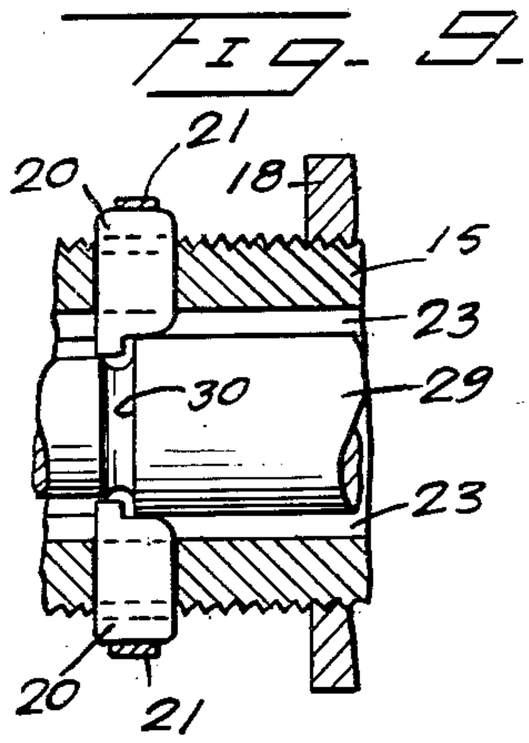


FIG. 5.



C. P. WILLIS
INVENTOR
BY C. A. Snow & Co.
ATTORNEYS.

United States Patent Office

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UPHOLSTERER'S PNEUMATIC TACK DRIVING HAMMER

Clyde Pharis Willis, Conover, N.C.

Filed Apr. 8, 1960, Ser. No. 21,022
5 Claims. (Cl. 1—44.4)

This invention relates to tools, of the pneumatic driving type used by upholsterers.

The primary object of the invention is to provide a power hammer which will successively feed tacks from a magazine into the path of travel of a pneumatically operated hammer in the form of a plunger rod, which positions the tacks upon contact therewith.

An important object of the invention is to provide a pneumatic hammer of this character which may be held at a particular location to drive a tack through the medium of a pneumatically operated hammer rod controlled by the movement of a trigger, thereby insuring the proper positioning of the tacks passing through the driving end of the tool.

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

A still further object of the invention is to provide a pneumatically operated hammer wherein the hammer rod will be moved to the rear end of the body of the hammer compressing a coiled spring held therein, means being provided for automatically releasing the hammer rod 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.

Still another object of the invention is to provide means for adjusting the tension of the spring to regulate the power and stroke of the hammer rod, thereby adapting the tool for a particular use.

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 without departing from the spirit of the invention as claimed.

Referring to the drawings:

FIGURE 1 is an elevational view of a pneumatically operated tack driving hammer, constructed in accordance with the invention.

FIGURE 2 is a longitudinal sectional view through the major portion of the tool.

FIGURE 2ª is a fragmental sectional view of the rear end of said tool.

FIGURE 2ᵇ is a fragmental sectional view through the driving end of the tool.

FIGURE 3 is a plan view of the driving end of the tool, the tack chute being shown in section.

FIGURE 4 is a sectional view taken on line 4—4 of FIGS. 1 and 3.

FIGURE 5 is a sectional view taken on line 5—5 of FIGS. 1 and 3.

FIGURE 6 is a sectional view taken on line 6—6 of FIGURE 3.

FIGURE 7 is a sectional view taken on line 7—7 of FIG. 2.

FIGURE 8 is a sectional view taken on line 8—8 of FIG. 2ᵇ.

FIGURE 9 is a fragmental longitudinal sectional view through the hammer rod setting sleeve.

FIGURE 10 is a side elevational view of said hammer rod setting sleeve.

FIGURE 11 is a sectional view taken on line 11—11 of FIG. 10.

FIGURE 12 is a transverse sectional view taken on line 12—12 of FIG. 2.

FIGURE 13 is a bottom view showing the manner of mounting the tack magazine.

Referring to the drawings in detail, the tool comprises a cylindrical body portion indicated generally by the reference character 5, the body portion 5 having its forward end threaded at 6 to secure the head 7 of the tool, which is internally threaded and fitted over the threaded end of the body portion 5, as shown by FIG. 2 of the drawings.

This head 7 is formed with a bore 8 extending longitudinally through the axis thereof, one end of the bore being enlarged and threaded at 9 to receive one end of the hammer rod barrel 10, the hammer rod barrel being of a length to extend to a point adjacent to the rear end of the body portion 5 where it is closed by means of the cap 11.

The rear end of the body portion 5 is closed by means of the threaded cap 12 and the cap is provided with a recess 13 in which one end of the coiled spring 14 rests. The coiled spring 14 is substantially large and encircles the hammer rod barrel 10, with one end thereof engaging one end of the cam sleeve 15, which is slidably mounted on the hammer rod barrel, as clearly shown by FIG. 2 of the drawings. This cam sleeve 15 is externally threaded throughout the major portion of its length and is provided with an annular flange 16 extended outwardly therefrom. This flange 16 provides a stop for the cup washer 17, which is held in place on the cam sleeve 15, by means of the nut 18. The cam sleeve 15 being of a diameter appreciably less than the interior diameter of the body portion 5 provides a chamber 19 between the cam sleeve and body portion 5, to receive air under pressure for moving the cam sleeve longitudinally of the hammer rod barrel, in one direction.

The cam sleeve 15 is formed with openings in which the cams 20 are slidably mounted, the cams 20 being normally urged inwardly by means of the spring member 21 that is secured to the outer surface of the cam sleeve 15 by a screw 22, as shown by FIGURE 11, the ends of the spring 21 resting against the outer ends of the cams 20.

These cams 20 move through slots 23 formed in the wall of the hammer rod barrel and are disposed diametrically opposite to each other. The rear ends of the slots 23 are inclined at 24 providing cam surfaces which lie in the path of travel of the cams 20 when the cam sleeve 15 moves to its limit at the rear end of the hammer rod barrel, so that as the cams ride over the inclined or beveled edges 24, the cams 20 will be moved outwardly for purposes to be hereinafter more fully described. A stop ring indicated at 25 is threaded on the rear end of the hammer rod barrel 10 and is held in place by set screw 26, to the end that the stop ring may be adjusted to various positions to regulate the rearward movement of the cam sleeve 15.

The hammer rod, which is indicated by the reference character 27, is slidably mounted within the hammer rod barrel 10 and is urged towards the forward end of the tool, by means of a coiled spring 28, mounted within the hammer rod barrel, one end of the coiled spring engaging the rear end of the enlargement 29 formed on the inner end of the hammer rod, while the opposite end of said coiled spring 28 rests against the threaded cap 11, as shown by FIG. 2ª. Due to this construction, it will be seen that the tension of the coiled spring 28 may be

regulated to project the hammer rod with various degrees of force to meet the requirements of use.

As shown by FIG. 2 of the drawings, the forward end of the enlargement **29** is formed with a shoulder **30** with which the cams **20** engage so that upon movement of the cam sleeve **15** towards the rear end of the tool, the hammer rod is moved therewith, the hammer rod being released as the cams **20** move outwardly over the inclined or beveled edges **24** of the slots **23**. The hammer rod is then projected forwardly by the action of the coiled spring **28**.

Formed on the hammer rod **27** and disposed in spaced relation with the shoulder **30**, is an annular shoulder **31**, which shoulder **31** is designed to contact the shoulder **32** formed in the surface of the bore **8**, as better shown by FIG. 2 of the drawings. This shoulder **31** is so arranged that when the hammer rod **27** moves to the limit of its forward movement in setting a tack, the hammer rod **27** will be in a position so that the cams **20** may engage the shoulder **30** for the return movement of the hammer rod **27**, with the sleeve **15**.

The head **7** is formed with elongated cut out portions **33** arranged on opposite sides thereof, within which the spring fingers **34** are arranged, the spring fingers **34** having their forward ends extending laterally as at **35**, where they lie in the path of travel of tacks delivered thereto from the magazine **36**, which is fed with tacks that are positioned in the chute **37**.

The magazine **36** is formed with a slot **38** that extends therethrough, the lower portion of the slot accommodating a pivoted arm **39** that has its forward end curved as at **40**, the curved end being of a length to extend through the slot, the curved upper surface of the pivoted arm providing a support for the lowermost tack **41** in the vertical line of tacks held within the magazine **36**, as better shown by FIG. 2[b] of the drawings.

The pivoted arm **39** is formed with a pair of inclined slots **42** arranged in vertical spaced relation with respect to each other, the slots **42** being provided for the reception of the pivot pins **43** that are secured to the rear of the magazine **36**. Thus it will be seen that upward movement of the pivoted arm **39** will cause an inward swinging movement of the arm and that upon downward movement of the arm, the curved end **40** will move between the lowermost tack **41** and adjacent upper tack, separating the lowermost tack from the line of tacks held in the magazine allowing the lowermost tack to assume a position as shown in dotted lines in FIG. 2[b] of the drawings, and within the path of travel of the hammer rod **27** which seats the tack upon sudden forward projection of the hammer rod.

Secured to the upper end of the pivoted arm **39** and extending laterally therefrom, is a short rod **44** that operates in a slot **45** of the lower arm **46** of the bell crank **47** which is pivotally mounted at one side of the magazine.

Swiveled on the upper arm of the bell crank lever **47** is a bearing member **48** which is formed with an opening to receive the threaded end of the actuating rod **49**, which actuating rod **49** has its rear end extended downwardly at **50** and forwardly at **51**, the forwardly extended end **51** being disposed through the opening **52** formed axially of the cap **12**, from which the forwardly extended end **51** passes through the opening **53** of the cap **11** that closes the rear end of the hammer rod barrel **10**, as clearly shown by FIG. 2[a] of the drawings. Thus, it will be seen that due to this construction, the forwardly extended end **51** of the actuating rod **49** normally lies in the path of travel of the rear end of the hammer rod **27** and is engaged by the hammer rod as the hammer rod moves to the limit of its rearward position, thereby operating the rod **49**, which results in the movement of the pivoted arm **39** to release a tack into the path of travel of the hammer rod **27**, for positioning as described.

The magazine **36** embodies separable sections which

are held together by means of bolts **53'** and **54**, which extend transversely through the sections of the magazine, the latter bolt constituting the pivot for the bell crank lever **47**, thereby providing a structure which may readily be assembled.

The forward end of the head **7** is formed with a recess in which the curved lower ends of the sections of the magazine are held.

Mounted for sliding movement on the forward end of the tubular extension of the head **7**, is a supporting ring **55** which is formed with slots **56** extending inwardly from the outer end thereof, in which the pivoted jaws **57** operate on their bearings **58** at their inner ends, while the outer ends of the jaws extend through slots **59**, which slots are formed in the tubular extension of the head **7** adjacent to the discharge end thereof. These pivoted jaws **57** are normally biased inwardly towards the body portion **5**, by means of the coiled springs **60**, which springs have one of their respective ends secured to the head **7** at **61**, while the opposite ends thereof are secured to the supporting ring **55**, at **62**.

The pivoted jaws **57** have their forward ends formed with stops **63** that are so constructed that they will engage the heads of the tacks as they are driven forwardly by the hammer rod, holding the tacks in the proper positions in securing an article.

A coiled spring **64** in the form of a ring, is positioned around the pivoted jaws **57** and rest in recesses **57'** formed in the outer surface of said jaws, as shown by FIG. 2 of the drawings. Thus it will be seen that due to this construction, the tacks which are being positioned, will be held in direct alignment with the work being secured by the tacks delivered with the tool.

The barrel **5** is provided with a block **65** to which the upper end **66** of a handle **67** is secured, the handle affording means for holding and manipulating the hammer as desired.

As better shown by FIG. 2 of the drawings, the handle is provided with a bore **68** that communicates with the interior of the body portion **5**, at a point between the cup washer **17** and end of the head **7** that connects with the body **5**. One end of the bore **68** is enlarged and interiorly threaded to receive the threaded coupling **69** of an air hose **70** that connects with a suitable source of compressed air, not shown. Through this bore **68** air is directed to the chamber **19** or space between washer or gasket **17** and the rear end of the head **7** to force the cam sleeve **15** rearwardly whereupon the cams **20** are moved outwardly releasing the hammer rod to the action of the coiled spring **28** operating the hammer rod to set a tack moved in the path of travel of hammer rod **27**.

An outlet passageway in the form of a bore **71** also extends longitudinally through the handle **67** and communicates with the chamber **19** between the washer or gasket **17** and the inner end of the head **7** so that air which enters the chamber **19** to operate the cam sleeve **15**, may exhaust to allow the coiled spring **14** to permit the return of the cam sleeve **15** to the forward end of the tool or to the limit of its forward movement for further operation towards the rear end of the tool under air pressure admitted through bore **68**.

A slide valve **72** is disposed within the handle and is normally urged to its outermost position by means of coiled spring **73** that is seated in a recess formed in one end of the valve **72** with one end of the spring contacting the inner end of the bore in which the valve **72** is mounted.

The valve **72** is formed with an opening **74** which is so constructed and arranged that it will normally register with the bore **71** releasing air from the chamber of the body **5**.

This opening **74** also communicates with the bore **68** when moved to its rear position to allow air under pressure to pass into the chamber of the body **5** and simultaneously close the bore **71**.

As shown by FIG. 5 of the drawings, the valve **72** is

formed with a stem **75** which projects through the nut **76** in one end of the bore in which the valve **72** operates.

This stem extends beyond the nut **76** and is engaged by the trigger **77** pivotally connected to the handle **67** at **78**. This trigger is so disposed that the person gripping the handle **67** may operate the trigger with the index finger of the hand.

In operation the hammer is positioned with the nozzle of the tool resting against the furniture to receive the tack in securing upholsterers' cloth. The trigger **77** is now operated to move the valve **72** rearwardly until the opening **74** registers with bore **68**, the bore **71** being closed. The air under pressure will enter the chamber **19** of the body **5** between the cup washer or gasket **17** and inner end of head **7**, forcing the cam sleeve **18** rearwardly against the combined action of the spring **14** and **28**, with the result that the hammer rod which is connected with the sleeve **15** through the medium of the cams **20**, will be moved to the rear end of the hammer rod barrel **10**. It is obvious that as the cams move upwardly over the inclined ends **24** of the slots **23** the cams will be moved out of contact with the shoulder **30** of the hammer rod **27**, releasing the hammer rod to the action of the compressed spring **14**, which projects the hammer rod **27** with such force as to set a tack which has gravitated into the path of travel of the driving end of the hammer rod.

When a tack has been set by the hammer it is obvious that the adjacent upper tack will fall into the bore of the head **7** to be set in a manner as described, by the succeeding action of the hammer rod.

By the continuous operation of the trigger **77** it will be obvious that the seating of the tacks will be continuous, until the supply of the tacks in the magazine has been exhausted.

In view of the foregoing detailed disclosure it is believed that further description as to the operation of the pneumatic hammer is unnecessary.

Having thus described the invention, what I claim is:

1. A tool of the class described, comprising a cylindrical body, a handle secured to said body by means of which the tool is manipulated, a hammer rod barrel mounted within said cylindrical body, a hammer rod slidable longitudinally within said hammer rod barrel, fluid controlled mechanism embodying a cam sleeve adapted to move said hammer rod rearwardly to set position within said cylindrical body, a coiled spring fitted in said hammer rod barrel against which said hammer rod moves tensioning said spring, means for releasing said hammer rod to the action of said tensioned coil spring projecting said hammer rod forwardly driving tacks fed into the path of travel of said hammer rod.

2. A tool of the class described, comprising a cylindrical body, a handle secured to said body for effecting manipulation of said tool, a hammer rod barrel mounted within said body, said hammer rod barrel having longitudinal slots in the wall thereof, one of the end walls of each slot being inclined, a hammer rod having an annular shoulder, mounted for sliding movement within said hammer rod barrel, a cam sleeve having cam openings in the wall thereof, slidable on said hammer rod barrel, cams carried by said cam sleeve, slidable through said openings and slot engageable with said shoulder of said hammer rod connecting said cam sleeve to said hammer rod, a washer mounted on said cam sleeve contacting the wall of said cylindrical body providing an air chamber with one end of said cylindrical body, mechanism for directing air under pressure to said chamber

moving said cam sleeve and hammer rod rearwardly, said cams moving over said inclined end walls of the slots disconnecting said cam sleeve and hammer rod, and mechanism for projecting said hammer rod forwardly when disconnected for contact with tacks fed into said housing setting said tacks.

3. A tool of the class described, comprising a cylindrical body, a handle for effecting manipulation of said tool, a hammer rod barrel within said cylindrical body, a hammer rod slidably mounted within said hammer rod barrel, a cam sleeve slidable on said hammer rod barrel, a washer carried by said sleeve contacting with said cylindrical body providing an air chamber within said cylindrical body, means for directing air under pressure to said air chamber for moving said cam sleeve rearwardly within said cylindrical body, mechanism for releasing said cam sleeve and hammer rod upon movement of said cam sleeve to the limit of its rearward movement, and mechanism for projecting said hammer rod forwardly against tacks successively delivered in the path of travel of said hammer rod, positioning said tacks.

4. A tool of the class described, comprising a cylindrical body, a tapered head having a bore, closing one end of said cylindrical body, a hammer rod barrel mounted within said cylindrical body aligning with said bore of the tapered head, said hammer rod barrel having longitudinal slots formed in the wall thereof, a hammer rod having an annular shoulder formed thereon mounted for sliding movement in said hammer rod barrel, a cam sleeve mounted for longitudinal sliding movement on said tubular housing, said sleeve having openings in the wall thereof, spring pressed cams mounted within said openings extending through said slots adapted to engage said shoulder of the hammer rod, connecting said cam sleeve and hammer rod, a washer mounted on said cam sleeve contacting the wall of said cylindrical body, providing an air chamber within one end of said cylindrical body, and mechanism for directing air under pressure to said air chamber moving said cam sleeve and hammer rod rearwardly within the cylindrical housing, cam surfaces on said hammer rod barrel over which said cams move forcing said cams outwardly and disengaging said hammer rod and cam sleeve, and a coiled spring for projecting said hammer rod forwardly into said tapered head for contacting with tacks delivered to said tapered head.

5. A tool of the class described, comprising a cylindrical body, a handle for effecting manipulation of said tool, a hammer rod barrel within said cylindrical body, a hammer rod slidably mounted within said hammer rod barrel, a cam sleeve slidable on said hammer rod barrel, a washer carried by said sleeve contacting with said cylindrical body providing an air chamber within said cylindrical body, means for directing air under pressure to said air chamber for moving said cam sleeve rearwardly within said cylindrical body, mechanism for releasing said cam sleeve and hammer rod upon movement of said cam sleeve to the limit of its rearward movement, a coiled compression spring mounted on said hammer rod barrel, normally urging said cam sleeve to its initial position, and a coiled compression spring mounted within said hammer rod barrel contacting with said hammer rod adapted to project said hammer rod forwardly for contacting tacks fed into said housing, independently of said first mentioned spring.

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