Jan. 6, 1953 H. L. GASKILL 2,624,047

AUTOMATIC HAMMER

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FIG. 1

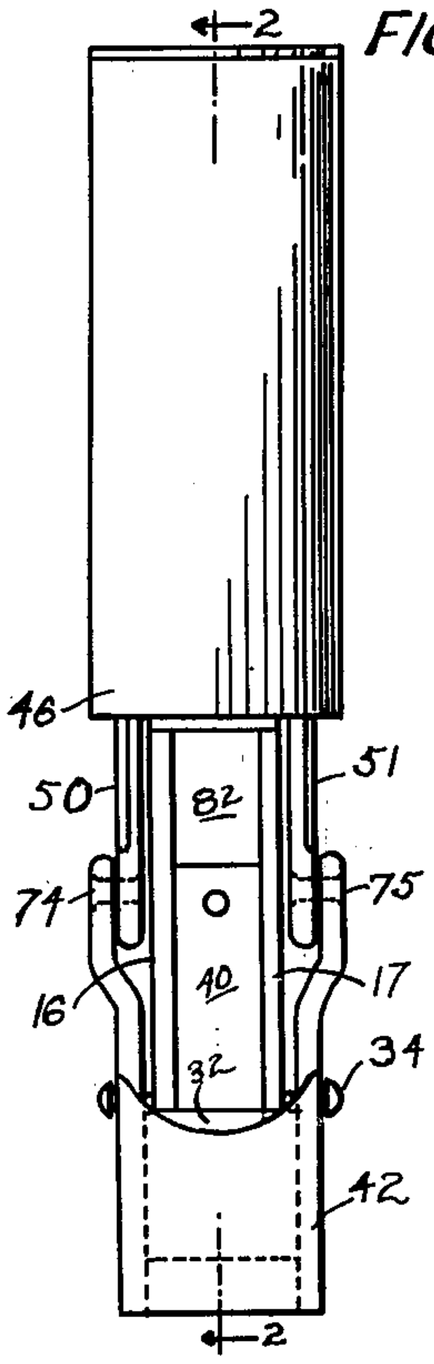

FIG. 2

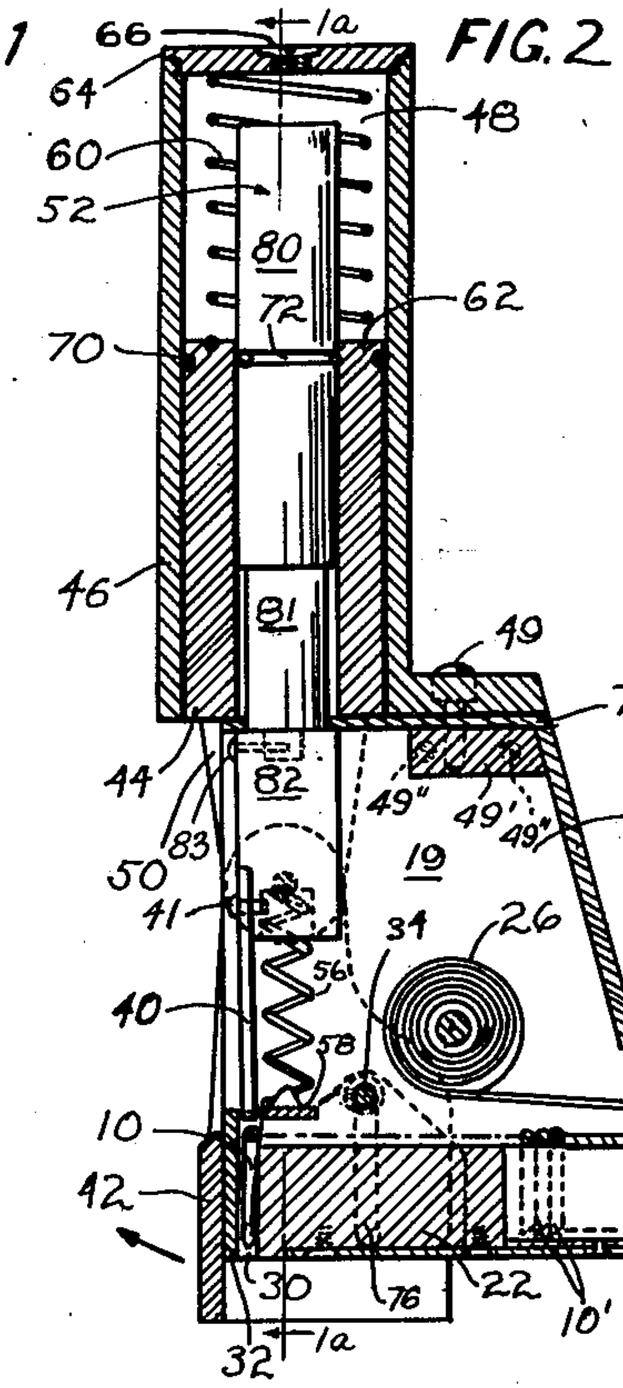

FIG. 4

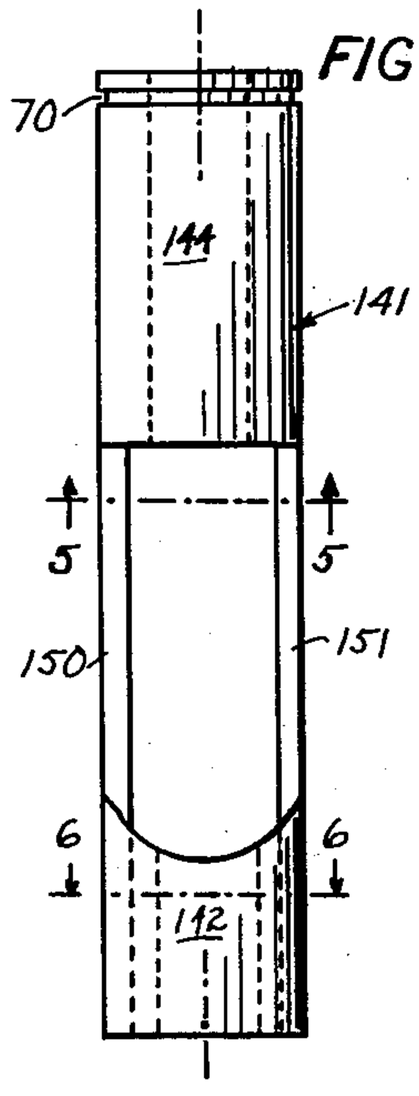

FIG. 5

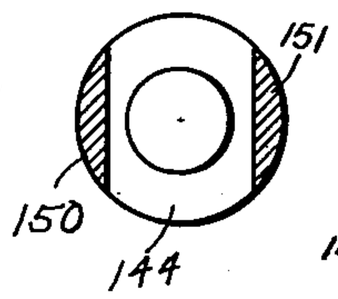

FIG. 6

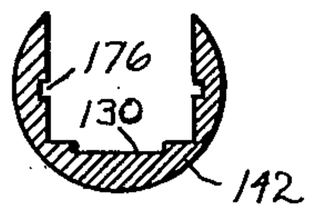

FIG. 7

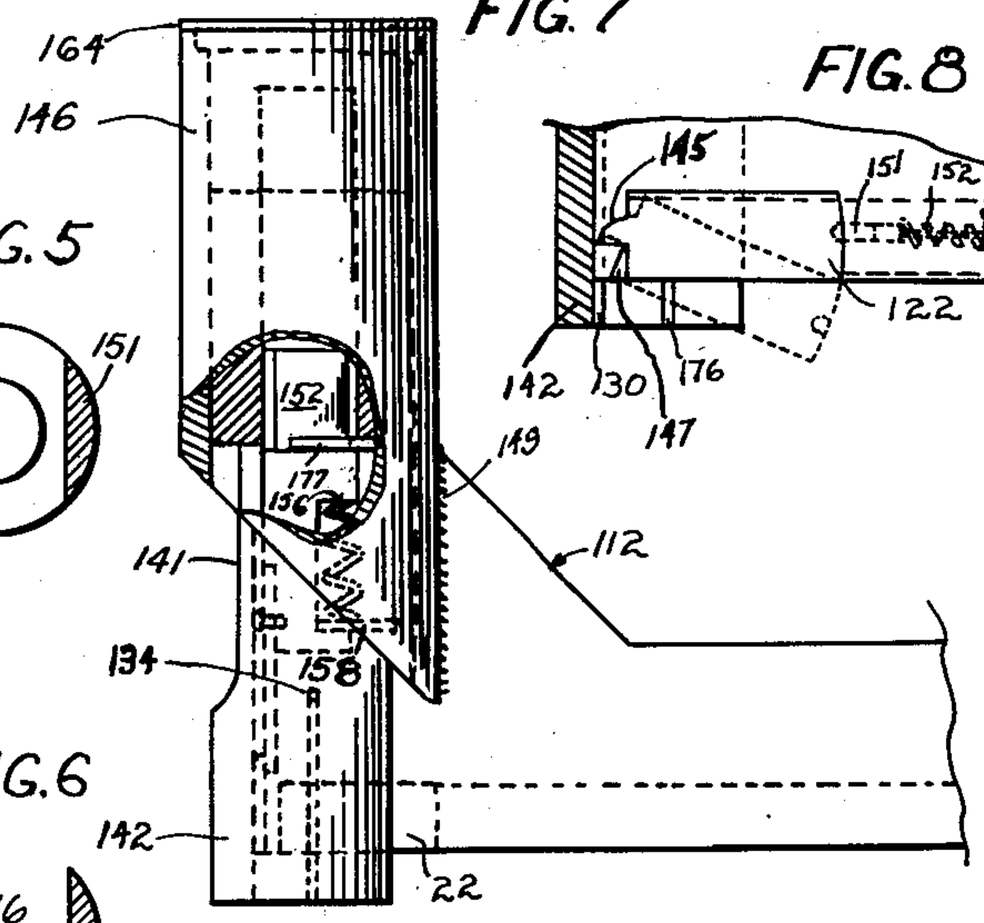

FIG. 8

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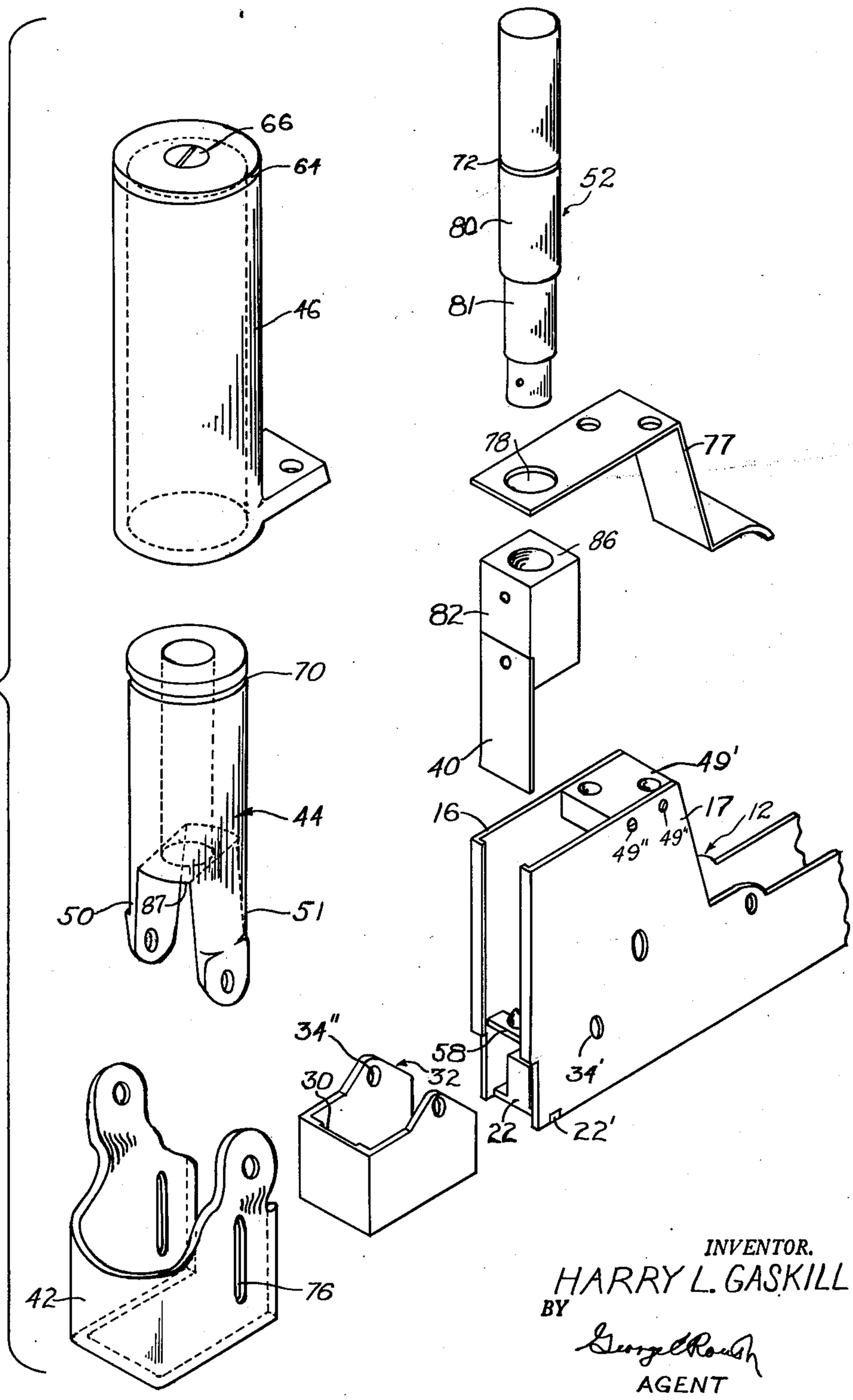
FIG 3



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AUTOMATIC HAMMER

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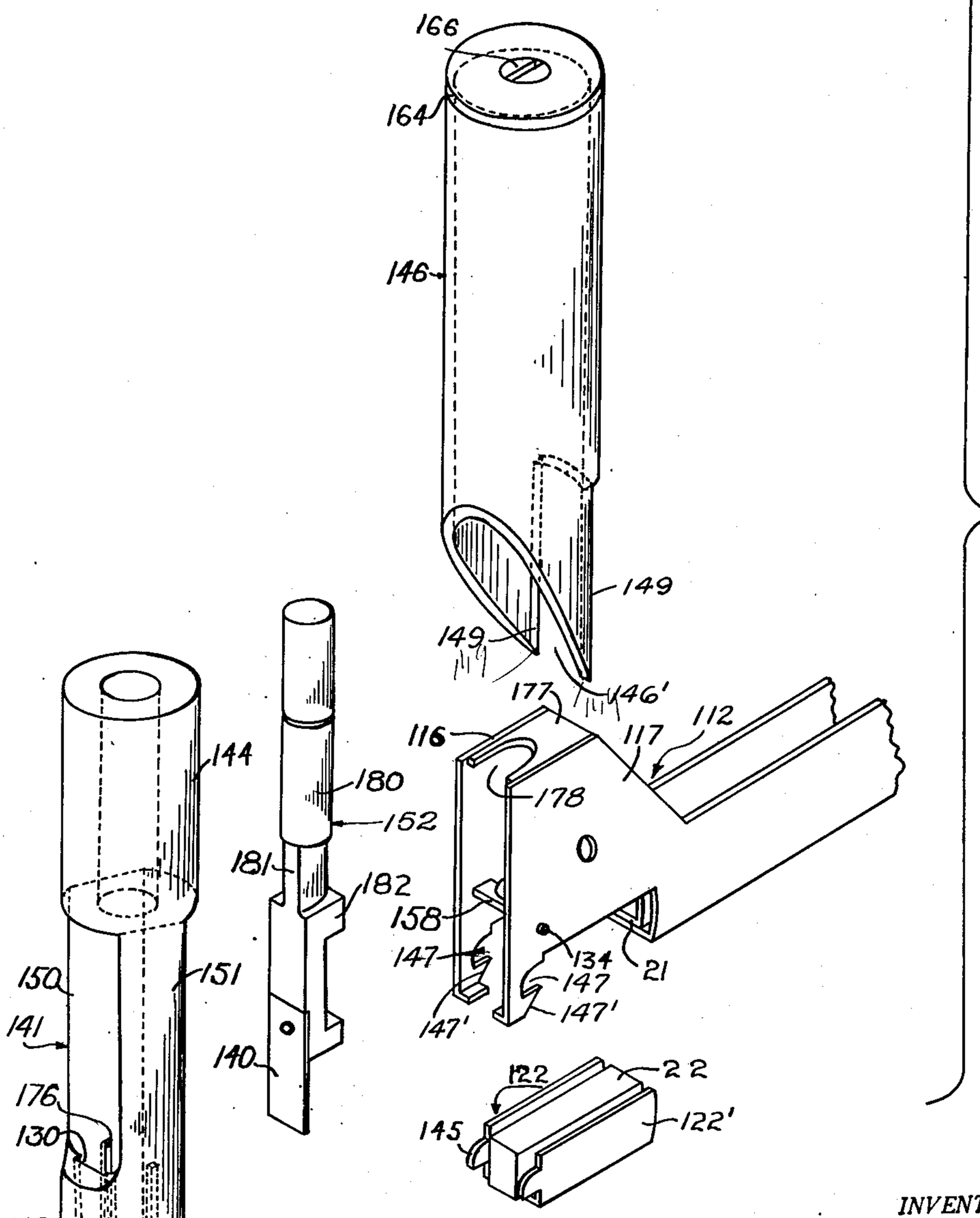

FIG. 9

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FIG. 10(c)

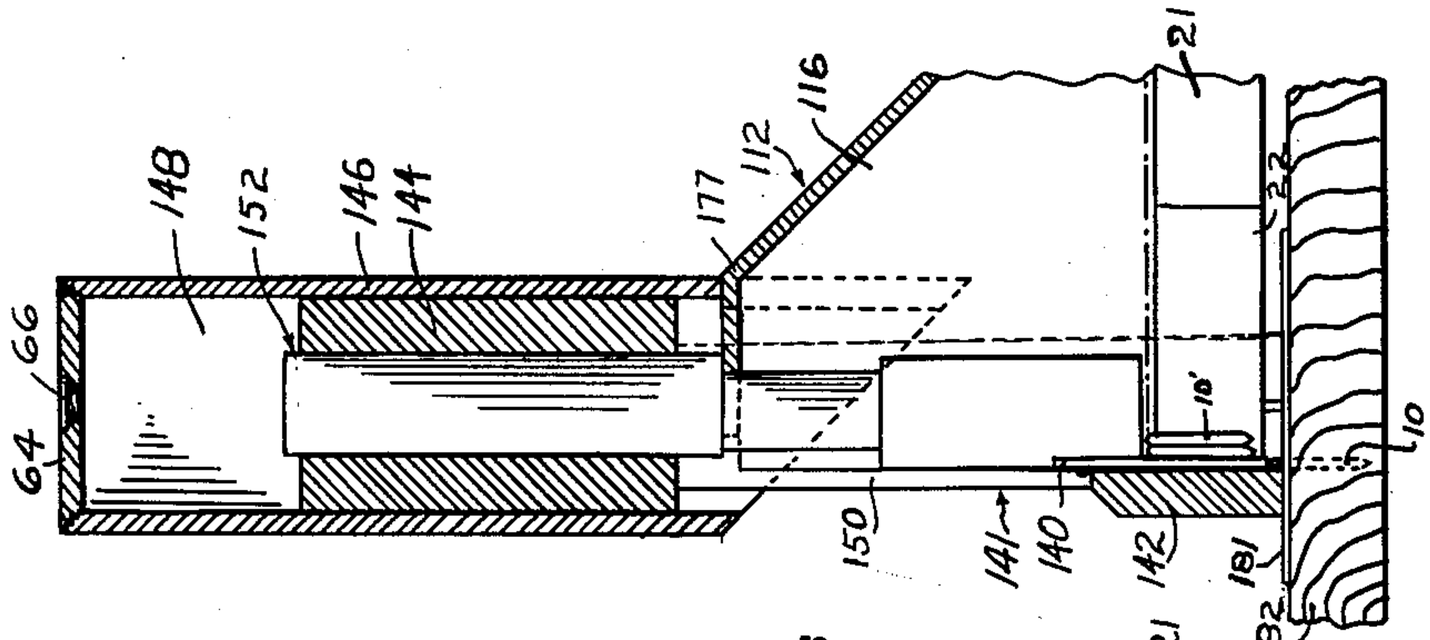


FIG. 10(b).

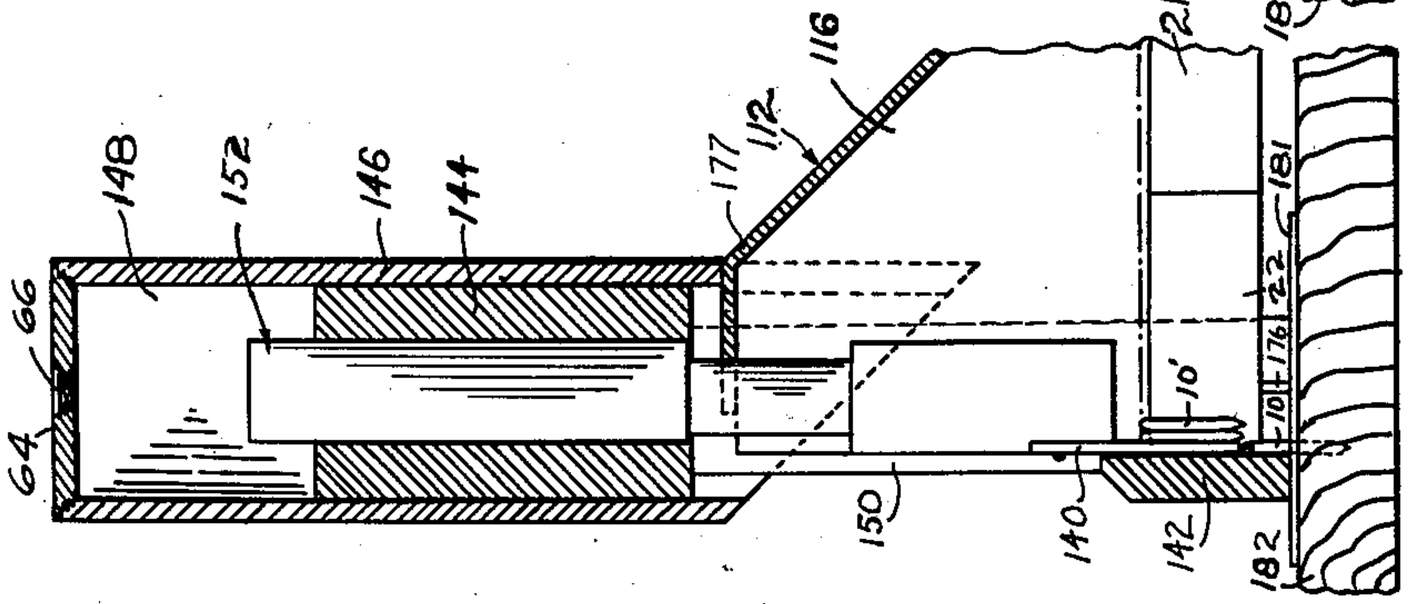


FIG. 10(a)

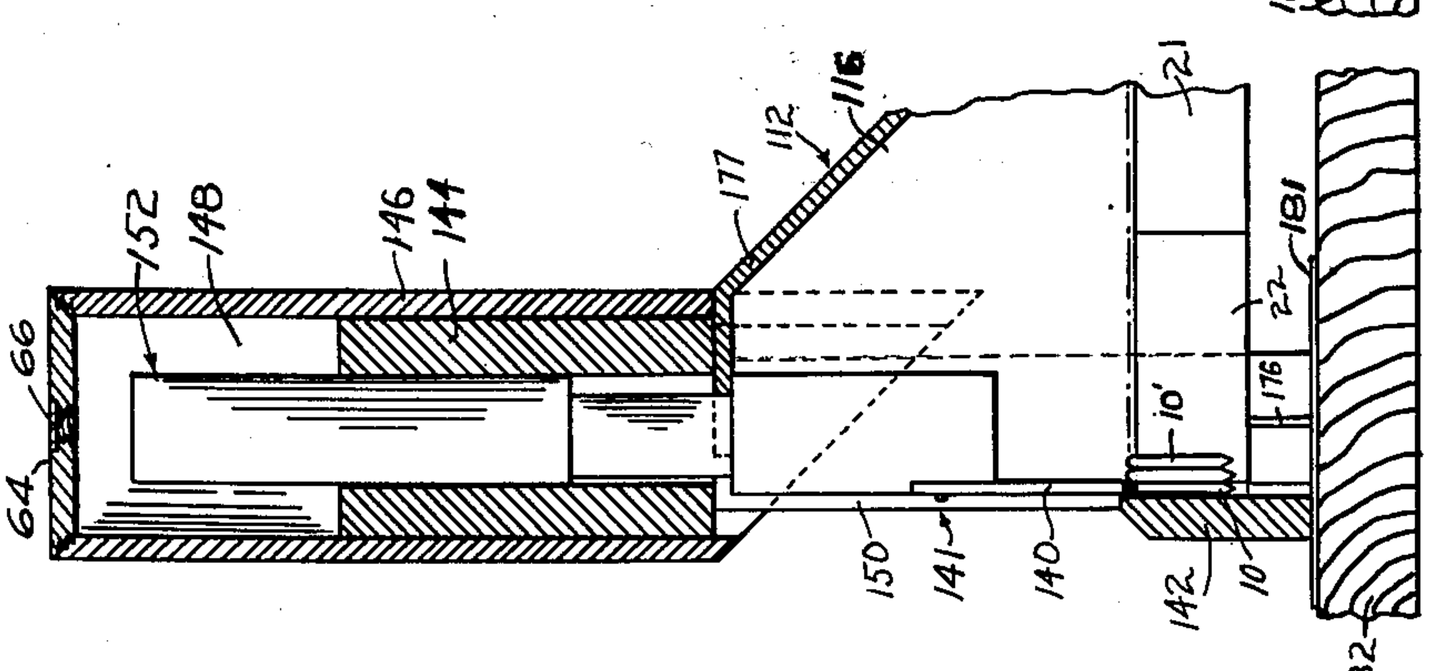
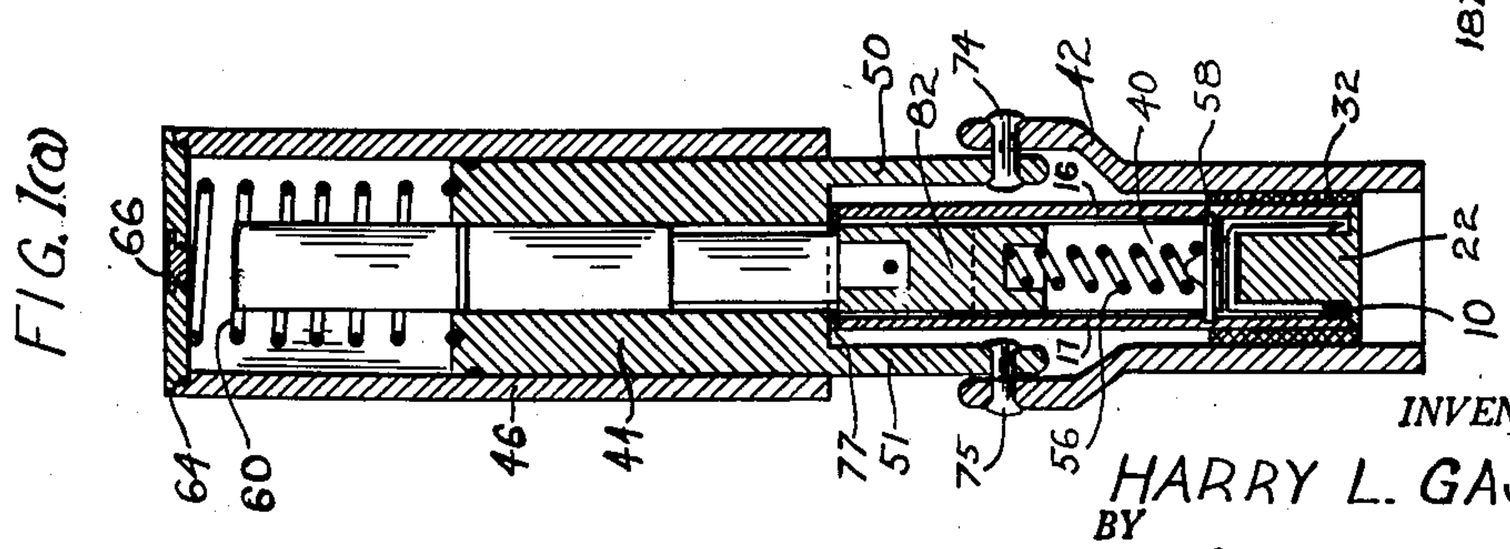


FIG. 1(a)



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Patented Jan. 6, 1953 2,624,047

UNITED STATES PATENT OFFICE

2,624,047

AUTOMATIC HAMMER

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Application January 16, 1950, Serial No. 138,787

17 Claims. (Cl. 1—49)

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The invention relates to tools for driving fastening devices, and it particularly pertains to a self feeding automatic hammer for driving staples.

Automatic hammers having various forms of rack-and-pinion or lever drive means are known to the art but these arrangements are possessed of several interrelated disadvantages among the most outstanding of which are high cost of manufacture, susceptibility of breakage, and complexity of repair, all of which add up to high operating costs.

It is an object of the invention to provide an automatic hammer having a hydraulic drive means whereby the above mentioned disadvantages are overcome.

It is another object of the invention to provide an automatic hammer in accordance with the foregoing object that has a minimum of moving parts and is inexpensive to manufacture.

It is a further object of the invention to provide an automatic hammer in accordance with the foregoing objects that can be disassembled with a minimum of tools for inspection and maintenance.

These and other objects of the invention which will appear as the specification progresses are attained in an automatic hammer having a hydraulic actuated driving member arranged to drive a fastening device into the work in response to the force exerted by a work striking member against the work; the work striking member being coupled to the driving member by hydraulic link means arranged to reverse the effective direction of force and also to absorb the initial shock. More specific objects of the invention are attained in an automatic hammer for driving staples, which has a rigid construction and readily demountable component parts.

The invention will be described in detail with reference to the accompanying drawing forming a part of the specification and in which:

Fig. 1 is a front view of an automatic hammer according to the invention; Fig. 1(*a*) is a cross-section view of the arrangement shown in Fig. 1 taken along the line 1*a*—1*a*;

Fig. 2 is a side view, partly in cross-section taken along the line 2—2, of the hammer according to the invention shown in Fig. 1;

Fig. 3 is an exploded view showing certain pertinent parts in detail of the hammer;

Fig. 4 is a view of an alternate embodiment of a one-piece piston and piston striker according to the invention;

Figs. 5 and 6 are cross-section views taken along the lines 5—5 and 6—6 respectively of the piston striker illustrated in Fig. 4;

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Fig. 7 is a side view, partly in cross-section, of an alternate embodiment of an automatic hammer according to the invention;

Fig. 8 is a detailed view of a portion of the arrangement of Fig. 7;

Fig. 9 is an exploded view of pertinent parts of the alternate embodiments; and

Figs. 10(*a*), 10(*b*) and 10(*c*) are consecutive illustrations of the mode of operation of the automatic hammer according to the invention.

Referring to Figs. 1, 2, and 3 there is shown an automatic hammer according to the invention for driving a desired type of fastener, shown here as a staple 10, although it should be understood that it is within the scope of the invention to provide for the driving of any of the headless types of fastening devices, such as pins, corner-fasteners, and the like. The body member 12 of the hammer is preferably made from heavy gage sheet metal stamped and folded into a U-shaped member having a bottom wall 14 of uniform width and side walls 16, 17 which are low in height for the greater part of the length of body member 12 forming the base of a handle portion 18 and which are relatively high for the remainder of body member 12 forming the base of the head portion 19 of the hammer. Staples 10 are arranged in a magazine 20, a part of which is located within handle portion 18 and the remainder of which is located in head portion 19. Body member 12 and magazine 20 may be constructed in accordance with known arrangements, the invention not being directly concerned therewith. In the preferred embodiment, magazine 20 comprises a U-shaped metal channel member 21 riveted to bottom wall 14 of the hammer and aligned with a guide block 22 which is keyed in a manner known to the art at the lower front end thereof into side walls 16, 17 and bottom wall 14 and fastened to the latter by screws. The transverse dimensions of channel member 21 and guide block 22 are such that preformed staples 10, which are cemented in the usual stick, are freely urged forward by a channel shaped sheet metal follower member 24 under the influence of a spiral spring 26. A lid 28, shown in raised position in Fig. 2, forms part of handle 18 and is provided to permit ready access to magazine 20 for replacing staples, clearing jams, and the like. Channel member 21 may be formed by pressing or stamping and the like, but in the interest of an improved product guide block 22 is preferably machined. Staple 10 is driven through a staple slot 30 formed in a guide plate 32 which is preferably machined from suitable material and attached to head portion 19 solely

by means of a pin 34 passing through apertures 34′ in side walls 16, 17 and apertures 34″ in guide plate 32 in a well known manner; and guide plate 32 is accurately aligned with guide block 22.

In the hammer according to the invention staples 10 are forced down through staple slot 30, formed in the front wall of guide plate 32 at one side of which an end of guide block 22 acts as a closure, by means of a conventional steel blade 40 having dimensions in accordance with standard machine shop tolerances to enable it to travel smoothly in slot 30. The motive power for activating blade 40 is obtained according to the invention by the relative upward motion of a striker 42 caused by the entire device being swung down onto the work in the same manner as the conventional hammer. Striker 42 moving upward relative to side walls 16, 17 forces a piston 44 having an annular cross-section up inside a cylinder 46 which is rigidly attached to the hammer by means of screws 49 (only one of which is shown) threaded into a strut 49′ which is fastened to side walls 16, 17 by screws 49. The upward movement of piston 44 displaces a volume of substantially incompressible hydraulic fluid which is interposed in the annular space 48 of cylinder 46. Piston 44, shown in cross-section in Figs. 1*a* and 2, has a thick walled tubular configuration with a bifurcated lower portion forming connecting rod portions 50, 51 as perhaps more clearly illustrated in Fig. 3. A ram 52 having a cylindrical plunger portion 80 arranged in the bore of piston 44 is driven downward relative to side walls 16, 17 by action of the hydraulic fluid in space 48 in accordance with well known hydraulic laws. Ram 52 is rigidly fastened at the lower end portion 82 to blade 40. Thus staple 10 is driven into the work by action of striker 42 being forced against the work. Once the staple 10 is driven, ram 52 and blade 40 are returned to the initial position by the action of a coil spring 56 exerted against a strut 53 arranged between side walls 16, 17. The return of ram 52 and blade 40 may be used to force piston 44 to its initial position, but it is considered desirable to assist this motion by means of compression spring 60 arranged in cylinder 46. Preferably a V-shaped annular groove 62 is cut into the top surface of pison 44 as shown in the cross-section view of Fig. 2 to form a seat for spring 60. The uppermost end of cylinder 46 is preferably constituted by a removable plug 64 having a threaded shoulder although a cap arrangement is also suggested. While cylinder 46 may be filled with fluid by removing plug 64, a filler plug 66 of smaller dimensions is preferably provided. Piston 44 and ram 52 are fitted with grooves 70 and 72 respectively to accept oil sealing rings of resilient material, such as the "Koroseal" oil rings now commonly used for such purposes, to prevent leakage of the substantially incompressible hydraulic fluid which is usually in the form of a liquid such as light mineral or petroleum base oil.

Striker 42 is made of heavy sheet steel stamped to form a generally U-shaped member having two ears extending upwardly from the sides thereof as shown in the forepart of Fig. 3, leaving a low throat at the front part of the striker 42, which allows access to the lower portion 82 of ram 52 for manually moving blade 40 in clearing jams and the like. Striker 42 is connected to piston 44 at the ends of rod portions 50, 51 by means of wrist pins 74, 75 and is guided in its movement

by pin 34 riding in slots 76 machined in striker 42. Pin 34 is made removable so that in case of jamming striker 42 may be rotated about wrist pins 74, 75 in the direction of the arrow to provide access to staple slot 30, guide plate 32 then being conveniently removable.

A top plate 77 is fastened to bear on the upper edge of side plates 16, 17 by machine screws 49. Top plate 77 is effective in limiting travel of ram 52 which is machined from a square bar to have a square end portion 82, a cylindrical plunger portion 80, and an undercut central portion 81 which passes through an aperture 78 in top plate 77. In the illustrated embodiment, ram 52 is made in two pieces, as shown in Figs. 2 and 3, and fastened together by a pin 83 after passing through top plate 77, although alternate construction, such as that later to be described in connection with Fig. 7, may be used. Ram 52 is limited in its downward movement by the shoulder 85 of the plunger portion 80 striking top plate 77 and limited in its upward movement by the square shoulder 86 of square portion 82 striking the underside of top plate 77. Piston 44 is limited in its downward movement by top plate 77 striking the flat surface 87 on the underside of piston 44 between the connecting rods 50, 51.

Referring to Figs. 4–9, there is shown an alternate embodiment of a hammer according to the invention which incorporates a number of additional advantageous constructional features. The handle and body are formed in much the same manner as the previously described hammer, and the staple feed mechanism is essentially the same, hence these parts will not be discussed in detail. A cylinder 146 having an extended portion in which there is located a rectangular slot 146′ having edges 149 spaced to accommodate the width of body member 112, is welded along edges 149 to side walls 116, 117 as shown. The lower end of cylinder 146 is preferably mitered as shown to permit ready access to the blade at the front of the hammer and also to provide a more pleasing appearance. The uppermost end of cylinder 146 is fitted with a plug 164 and filler plug 166 as in the previous description of the basic embodiment. A unitary piston-striker 141 comprising a striker portion 142 and a piston portion 146 joined by strut portions 150, 151 is machined in one piece as shown in Figs. 4–6 which makes for a stronger and smoother acting tool. A cross-section of piston-striker 141 showing the shape of the connecting rod portions 150, 151 taken along the line 5—5 is shown in Fig. 5, and a cross-section of the striker portion 142 taken along the line 6—6 is shown in Fig. 6. Ram 152 is constructed in one piece with a cylindrical plunger portion 180, and a central portion 181 preferably undercut on three sides only to provide a greater surface bearing on a travel-limiting strut 177 which is welded between side walls 116, 117. The details of ram 152 and blade 140, together with the relationship thereof to the head portion of body member 112, may be obtained from an inspection of the exploded view of these parts in Fig. 9. Strut 177 has a U-shaped notch 178 in the forward edge thereof in which the undercut central portion 181 of ram 152 fits.

With such construction the hammer is assembled by first inserting ram 152 down from above into cylinder 146 ahead of strut 177 and partly in the space provided for piston 144 and then moving it to the rear to engage the undercut central portion 181 in the U-shaped notch 178 of strut 177, at the same time inserting spring 156

between ram 152 and strut 158, a space for which is preferably provided in the lower part of ram 152 to permit a foreshortened construction thereof. Piston-striker 141 is next inserted down from above into cylinder 146 around ram 152 and engaging pins 134 on either side of body 112 in grooves 176 to guide and limit travel of piston-striker 141. The blade 140 rides in channel 130 of striker portion 142 of piston-striker 141, so that the latter forms in effect the front guide plate corresponding to guide plate 32 of the first embodiment. Spring 160 is positioned and plug 164 put in place to hold the parts together. The hydraulic liquid is added by way of the filler aperture, which is then closed by the filler plug 166.

In case of jams the hammer as shown in Fig. 7 may readily be disassembled in reverse order to the assembly previously described, however, a better construction for clearing jams is shown in Figs. 8 and 9, wherein there is shown an embodiment having a removable guide block assembly 122. A portion of bottom wall 114 and side walls 116, 117 are cut away and a channel member 122' carrying guide block 22 is inserted in their stead to complete the hammer as before. Assembly 122 is held in place at the forward end by arcuate lugs 145 engaging complementary notches 147, the front edges 147' of which are swept forward to permit rotation of the whole assembly 122 as shown in dotted lines in Fig. 8 to permit insertion and removal. Since practically the only force exerted against block 22 is at the forward end where the staples 10 are ejected by blade 140, a simple bullet catch 151 under the influence of spring 152 serves to hold assembly 122 in place. Catch 151 and spring 152 are conveniently arranged inside channel member 21 of staple magazine 20.

Referring to Figs. 10(*a*), 10(*b*) and 10(*c*) there is shown a series of views illustrating the mode of operation of the automatic hammer according to the invention. In these figures the embodiment of the invention shown in Figs. 4–9 has been chosen for convenience, but it should be clearly understood that the principle of operation applies equally well to the embodiment shown in Figs. 1, 1(*a*), 2 and 3. In Figs. 10(*a*), 10(*b*) and 10(*c*) only those parts directly concerned with the novel operating features of the invention are shown in the interest of clarity.

Assuming that it is desired to staple a card 181 to a board 182, the hammer is brought down onto the work comprising the card 181 on board 182 in exactly the same manner as would be done with an altogether conventional hammer. As the hammer according to the invention approaches and just touches the work as shown in Fig. 10(*a*) representing the hammer in the initial operating position, piston-striker 141 is at the lowermost position with respect to body member 112 and ram 152 is at the uppermost position. Staple 10 is suspended in feed slot 130 below blade 140 by the glue holding staple 10 to staples 10' in the staple stick which is urged forward by follower 24 under the influence of spring 26. (The latter parts are not shown in Fig. 10(*a*) but are shown in Fig. 2.) For clarity, staple 10 is shown in cross-section while staples 10' are shown in full elevation.

As the hammer according to the invention continues to be forced against the work, body member 112 is moved downward with respect to piston-striker 141 as shown in Fig. 10(*b*) representing the hammer in an intermediate operating position, carrying cylinder 146 downward with it. Piston portion 144 of piston-striker 141 thereby rises within cylinder 146 and forces ram 152 downward with respect to body member 112 and cylinder 146 due to the reaction of the substantially incompressible fluid in space 148. The downward movement of ram 152 and blade 140 with respect to body member 119 shears staple 10 from the staple stick and forces it into the work beneath blade 140.

At the end of the stroke, as shown in Fig. 10(*c*) representing the hammer in the final operating position, piston-striker 141 is still in contact with card 181 and body member 112 is at the lowermost position relative thereto. Piston portion 144 of piston-striker 141 is therefore at the maximum upward position within cylinder 146 and ram 152 along with blade 140 is at the maximum downward limit of travel, preferably being limited thereat by strut 177, and staple 10 is completely driven into the work.

Upon lifting the hammer according to the invention, the combined spring and hydraulic action causes the parts to resume the initial position as shown in Fig. 10(*a*) in readiness for the next blow.

While the invention has been described in terms of express embodiments, it is to be clearly understood that many obvious modifications of minor parts thereof will be suggested by those skilled in the art without departing from the spirit and the scope of the invention.

The invention claimed is:

1. A staple driving device including a body member having a head portion at one end thereof and a handle portion, said head portion comprising a support including spaced upright members, a top member carried by said upright members, a cylinder mounted on said top member and closed at the end thereof remote from said top member, a piston having a central bore therein and connecting rod portions slidably arranged in said cylinder with said connecting rod portions straddling the head portion of said body member, a striker mounted for upward and downward movement beneath said piston, said striker projecting below said body member and being pivotally connected to said connecting rod portions of said piston, means attached to said upright members to form a guideway, for a staple, a driving blade positioned in said guideway, a ram affixed to said driving blade and positioned in the bore of said piston to close the chamber formed at the closed end of said cylinder by said piston, said chamber being filled with a substantially incompressible fluid operable to shift said ram and said driving blade downward to drive a staple through said guideway in response to upward movement of said striker and said piston as a result of a blow against an object by said striker, and means to feed staples to the driving position.

2. A device for driving fasteners, including a body member, a cylinder mounted on said body member and closed at the end thereof remote from said body member, a piston having a central bore therein and diametrically opposed connecting rod portions, said piston being slidably mounted within said cylinder with said connecting rod portions straddling said body member, a striker mounted on said body member and arranged for upward and downward movement beneath said piston, said striker projecting below said body member and being connected to said connecting rod portions of said piston, means within said body member to form a guideway for

a fastener to be driven, a driving member positioned in said guideway, a ram affixed to said driving member and slidably positioned in the bore of said piston to close the chamber formed at the closed end of said cylinder by said piston, said chamber being filled by a substantially incompressible fluid operable to shift said ram and said driving blade downward to drive a fastener through said guideway in response to upward movement of said striker and said piston as a result of a blow against an object by said striker, and means to feed fasteners to the driving position.

3. A staple driving device including a handle portion, a striking head portion including a body member secured to said handle portion, an upright striking element slidably mounted on said body member, means arranged on said body member and within said striking element to form a guideway for a staple, a cylinder mounted on said body member above said striking element, said cylinder being closed at the end remote from said striking element, a piston having an internal bore therein slidably arranged in said cylinder, means interconnecting said piston with said striking element, said striking element projecting below said body member, a driving blade slidably positioned in said guideway, a ram affixed to said driving blade and positioned in the bore of said piston to close the chamber formed at the closed end of said cylinder by said piston, said closed chamber being filled by a substantially incompressible fluid operable to shift said ram and said driving blade downward to drive a staple through said guideway in response to upward movement of said striking element and said piston as a result of a blow against an object by said striking element, and means arranged within said handle portion to feed staples to the driving position.

4. A staple driving device including a handle, a staple guide bar mounted in and extending longitudinally of said handle, means for feeding staples along said bar to the forward end thereof, a striking head portion at the forward end of said handle including spaced upright side plates, a top plate carried by said side plates, a cylinder mounted on said top plate and closed at the upper end thereof, a piston having an internal bore therein slidably arranged in said cylinder, a striker mounted for upward and downward movement beneath said piston at the forward end of said bar and providing therewith a guideway for a staple to be driven, said striker projecting below said striking head portion in striking position, a driving blade arranged to slide in said guideway to drive a staple therethrough, a ram affixed to said driving blade and positioned in the bore of said piston to close the chamber formed at the lower end of said cylinder by said piston, said chamber being filled by a substantially incompressible fluid operable to shift said ram and said driving blade downward to drive a staple by upward movement of said striker and said piston by a blow against the lower end of said striker against an object.

5. A staple driving device including a body member having a head structure at one end thereof and a handle structure at the other end thereof, a vertically slidable striking element arranged on said head structure at the front of said body member, said element projecting at the lower end thereof below said body member, means within said head structure providing a guide for a staple, a staple driving blade slidably arranged

in said guide means, a cylinder having one end thereof closed aligned with said striking element and affixed to said body member, a piston having a central bore and being mechanically coupled to said striking element to move up and down in said cylinder, a ram arranged in said piston and mechanically coupled to said driving blade, said ram closing the chamber in the closed end of said cylinder formed by said piston, said chamber being filled with a substantially incompressible fluid operable by upward movement of said striking element and said piston as a result of a blow against an object to shift said ram and said driving blade downward to drive a staple through said guide means, and means for feeding staples to the driving position.

6. A staple driving device including a body member, a striking element slidably mounted on one end of said body member and protruding therebelow, a cylinder mounted on said body member above said striking element, a piston element slidably arranged in said cylinder and having an internal bore, connecting rod elements joining said striking and said piston elements for simultaneous movement thereof, means within said body member and within said striking element forming a guideway for a staple, a blade element slidably arranged in said guideway, a ram element slidably arranged in the bore of said piston thereby closing one end of said cylinder, a member connecting said blade and said ram elements for simultaneous movement thereof, the other end of said cylinder being closed to form a chamber thereat, said chamber being filled with a substantially incompressible fluid operable to shift said ram and said blade elements downward to drive a staple through said guideway in response to upward movement of said striking and said piston elements as a result of a blow on the protruding end of said striking element against an object.

7. A staple driving device including a body member having a head structure at one end thereof and a handle structure, a vertically slidable striking element arranged on said head structure at the front of said body member, said element projecting at the lower end thereof below said body member, means within said head structure providing a guideway for a staple, a staple driving blade slidably arranged in said guideway, a cylinder having one end thereof closed aligned with said striking element and affixed to said body member, a piston having a central bore and being mechanically coupled to said striking element to move up and down in said cylinder, resilient means in said cylinder urging said piston downward, a ram arranged in said piston and mechanically coupled to said driving blade, further resilient means arranged between said body member and said ram urging said ram upward, said ram closing the chamber formed in the closed end of said cylinder formed by said piston, said chamber being filled with a substantially incompressible fluid operable by upward movement of said striking element and said piston as a result of a blow against an object to shift said ram and said driving blade downward to drive a staple through said guideway, and means arranged in said handle structure for feeding staples to the driving position.

8. A staple driving device including a body member having a head structure at one end thereof and a handle structure, a vertically slidable piston-striker unit arranged on said head structure at the front of said body member, said

piston-striker unit projecting at the lower end thereof below said body member and at the upper end thereof above said body member, means within said head structure and coacting with said piston-striker unit to form a guideway for a staple, a staple driving blade slidably arranged in said guideway, a cylinder having one end thereof closed and being affixed to said body member, said cylinder surrounding the upper end of said piston-striker unit, said upper end of said piston-striker having a central bore, a ram slidably arranged in the central bore of said piston-striker unit and being mechanically coupled to said driving blade; said ram serving to close the chamber formed in said cylinder by said piston-striker unit, said chamber being filled with a substantially incompressible liquid operable by upward movement of said piston-striker unit as a result of a blow against an object to shift said ram and said driving blade downward to drive a staple through said guideway, and means for feeding staples to the driving position.

9. A fastener driving device including a body member, a striking element slidably mounted on said body member and protruding therebelow, a cylinder mounted on said body member above said striking element, a piston element slidably arranged in said cylinder and having an internal bore, members connecting said striking and said piston elements for simultaneous movement thereof, means within said body member and within said striking element forming a guideway for a fastener, a blade element slidably arranged in said guideway, a ram element slidably arranged in the bore of said piston thereby closing one end of said cylinder, a further member connecting said blade and said ram elements for simultaneous movement thereof, the other end of said cylinder being closed to form a chamber thereat, said chamber being adapted to receive a quantity of substantially incompressible fluid operable to shift said ram and said blade elements downward to drive a fastener through said guideway in response to upward movement of said striking and said piston elements as a result of a blow on the protruding end of said striking element against an object.

10. A staple driving device including a handle, a head structure at one end of said handle including side plates secured to said handle and a vertically slidable striking element mounted on said head structure and projecting therebelow, means within said head structure providing a guideway for a staple, a staple driving blade within said head structure and slidably arranged in said guideway, a cylinder aligned with said striking element and affixed to said head structure, a piston having a central bore and being connected to said striking element to move up and down in the lower part of said cylinder, a ram arranged in said piston and connected to said driving blade, said ram closing the lower end of said cylinder, a plug member closing the upper end of said cylinder to form a chamber thereat, said chamber being filled with a substantially incompressible liquid whereby upward movement of said piston resulting from a blow against an object by said striking element serves to shift said ram downward to drive a staple through said guideway beneath said driving blade, and means to feed staples to the driving position.

11. A staple driving device including a handle, a guide bar in said handle, a striking head structure at one end of said handle including upright walls spaced by strut members, a vertically slidable striking element arranged on said upright walls of said head structure at the front thereof for reciprocating movement thereon, said striking element projecting at the lower end thereof below said handle, means forming a part of said head structure and coacting with said guide bar to provide a guide for a staple to be driven, a staple driver arranged for reciprocating movement in said guide means, a cylinder having the upper end closed and being affixed to said upright walls in line with said striking element, a piston having an internal bore and being connected to said striking element for reciprocating movement in said cylinder, a spring in said cylinder tending to force said piston down and retract said striking element, a ram arranged for reciprocating movement in said piston and coupled to said staple driver, another spring bearing against one of said strut members and said ram tending to force said ram upward and retract said staple driver, said ram closing a chamber in the upper end of said cylinder formed by said piston, said chamber being filled with a substantially incompressible liquid operable by upward force of said striking element and said piston resulting from a blow against an object by said striking element to shift said ram and said staple driver downward to drive a staple through said guide means, and means for feeding staples along said bar to the driving position.

12. A staple driving device having a body member, a striker member arranged on said body member for reciprocating movement, said striker member normally projecting beyond said body member, a guideway for a staple to be driven arranged within said body member, a staple driving blade arranged for reciprocating movement in said guideway, a hydraulic lever arrangement comprising a cylinder member, and a pair of piston members arranged for concentric reciprocating movement in said cylinder member, said cylinder member being affixed to said body member, one of said piston members being coupled to said striker member and the other being coupled to said staple driving blade, said cylinder member being filled with a substantially incompressible liquid operable to force said staple driving blade through said guideway by pressure on said other piston member in response to movement of said one piston member as a result of a blow against an object by said striker member forcing said one piston member in a direction opposite to the direction of force on said staple driving blade.

13. A staple driving device having a body member, a striker member arranged on said body member for reciprocating movement and extending beyond said body member at one extremity of said movement, a guideway for a staple arranged in said body member and parallel to the direction of said movement, a staple driving blade arranged for reciprocating movement in said guideway, hydraulic means arranged to reverse the direction of force obtained from movement of said striker member as a result of a blow against that portion of said striker member extending beyond said body member by an object to force a staple through said guideway before said driving blade, said hydraulic means comprising a casing and a pair of piston members arranged for parallel reciprocating movement in said casing, one of said piston members being coupled to said striker member and the other to said driving blade, said casing being connected to said body member, and a quantity of substantially incompressible liquid filling said casing.

14. A staple driving device including a body member, means within said body member forming a guideway for a staple, a tubular member positioned above said guideway and affixed to said body member, the top of said tubular member being closed, a tubular element slidably arranged within the lower part of said tubular member, a striker element arranged on said body member for upward and downward movement, means coupling said striker and said tubular elements for simultaneous movement thereof, a ram member slidably arranged within said tubular element, a staple driving blade arranged for downward and upward movement in said guideway, means connecting said ram and said staple driving members for simultaneous movement thereof, the upper part of said cylinder being filled with a substantially incompressible liquid operable in response to a blow against the under part of said striker element forcing said tubular element upward in said tubular member to shift said ram member downward to drive a staple through said guideway before said staple driving member.

15. A staple driving device having a body member, a striker member arranged on said body member at the front thereof for upward and downward movement, a guideway for a staple to be driven arranged within said body member, a staple driving blade arranged for downward and upward movement in said guideway, a hydraulic mechanism comprising a casing member affixed to said body member and having the upper end thereof closed, a pair of piston members movably arranged in said casing member, one of said piston members surrounding the other and having an extended portion projecting below said casing member and connected to said striker member, the other of said piston members being connected to said staple driving blade, said casing member above said piston members being filled with a substantially incompressible liquid whereby said staple driving blade is forced downward to drive a staple through said guideway by downward movement of said other piston member in response to upward movement of said one piston member as a result of a blow against an object by said striker member, a staple guide bar arranged to feed staples to said guideway, and means for removing an end portion of said staple guide bar adjacent said guideway.

16. A mechanism for driving fastening devices including a body member having means forming a guideway for a fastening device to be driven and means to feed fastening devices to

said guideway, a fastening device driver arranged for reciprocating movement in said guideway, a work striker member arranged on said body member for upward and downward movement in the general direction of said guideway, hydraulic means for control of said driver by said work striker member comprising a chamber member affixed to said body member, a pair of piston members movably arranged in said chamber member, one of said piston members being coupled to said work striker member and the other of said piston members being coupled to said fastening device driver, said chamber being arranged to be filled by a substantially incompressible fluid whereby a fastening device is driven through said guideway by said driver by movement of said other piston member in response to hydraulic pressure applied by said one piston member as a result of a blow against an object by said work striker member.

17. A staple driving device including a body member, a guideway for a staple to be driven affixed to said body member, a staple driving member arranged for reciprocating movement in said guideway, a work striker member arranged on said body member for reciprocating movement in a direction parallel to said staple driving member and partly surrounding said staple driving member, a chamber element affixed to said body member, a pair of piston elements movably arranged in said chamber element, one of said piston elements being coupled to said staple driving member and the other being coupled to said work striker member, said chamber being arranged to be filled with a substantially incompressible fluid whereby a staple is driven through said guideway by said staple driving member by movement of said one piston element in response to hydraulic pressure applied by the other piston member as a result of a blow against an object by said work striker member.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,345,267	Keil	Mar. 28, 1944
2,412,620	Kipp	Dec. 17, 1946
2,482,993	Walker	Sept. 27, 1949
2,537,601	Peterson	Jan. 9, 1951