Sept. 29, 1953 W. R. BECKMAN ET AL 2,653,316

HAMMER STAPLER

Filed Oct. 28, 1950 6 Sheets-Sheet 1

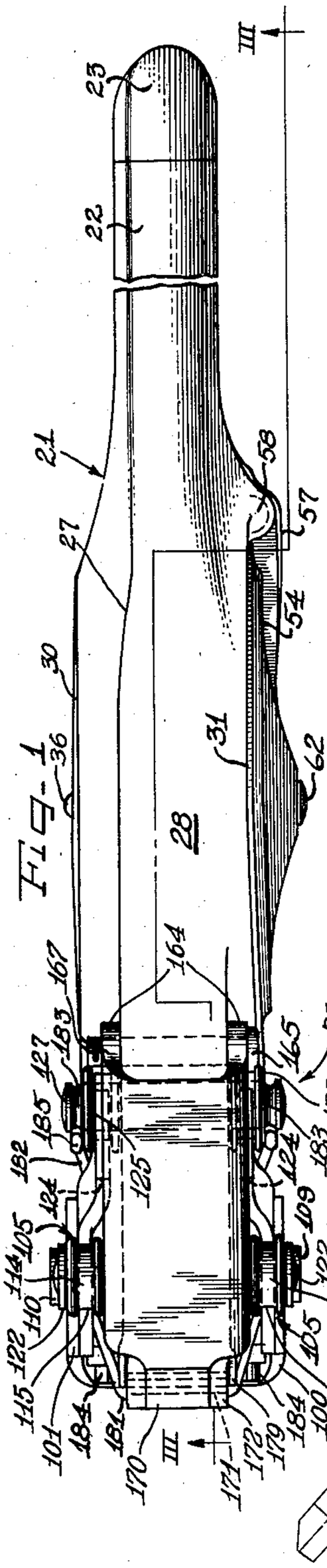

FIG. 1

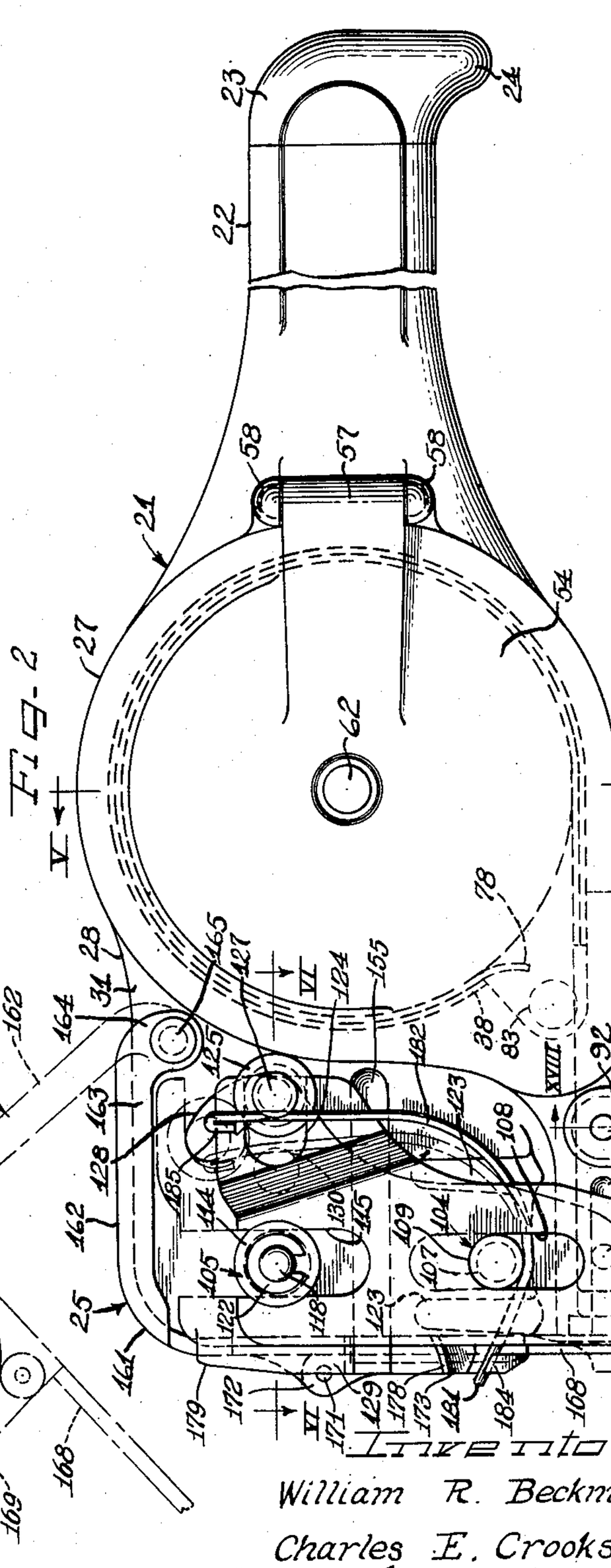

FIG. 2

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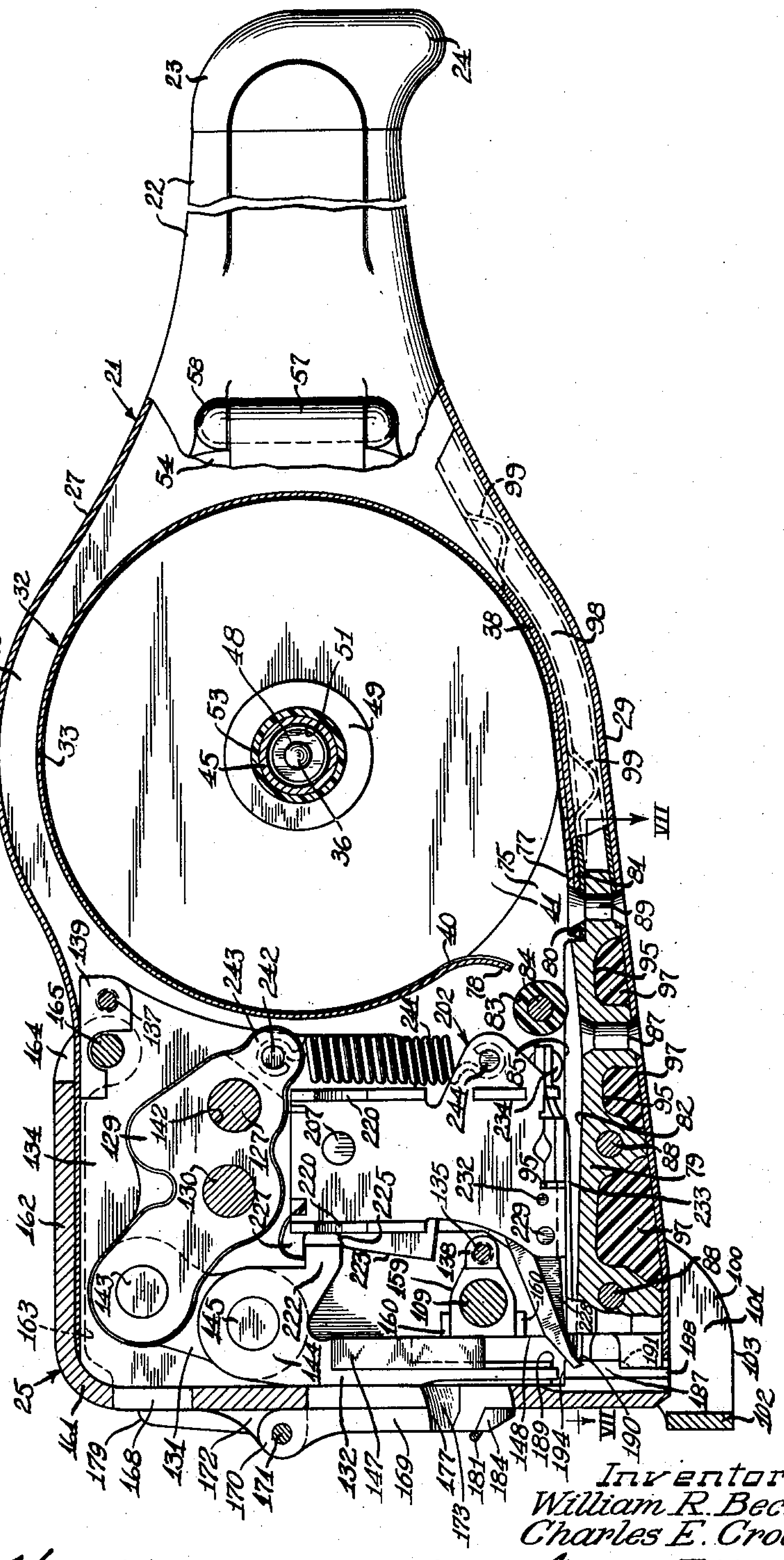
Fig-3



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HAMMER STAPLER

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Fig. 4

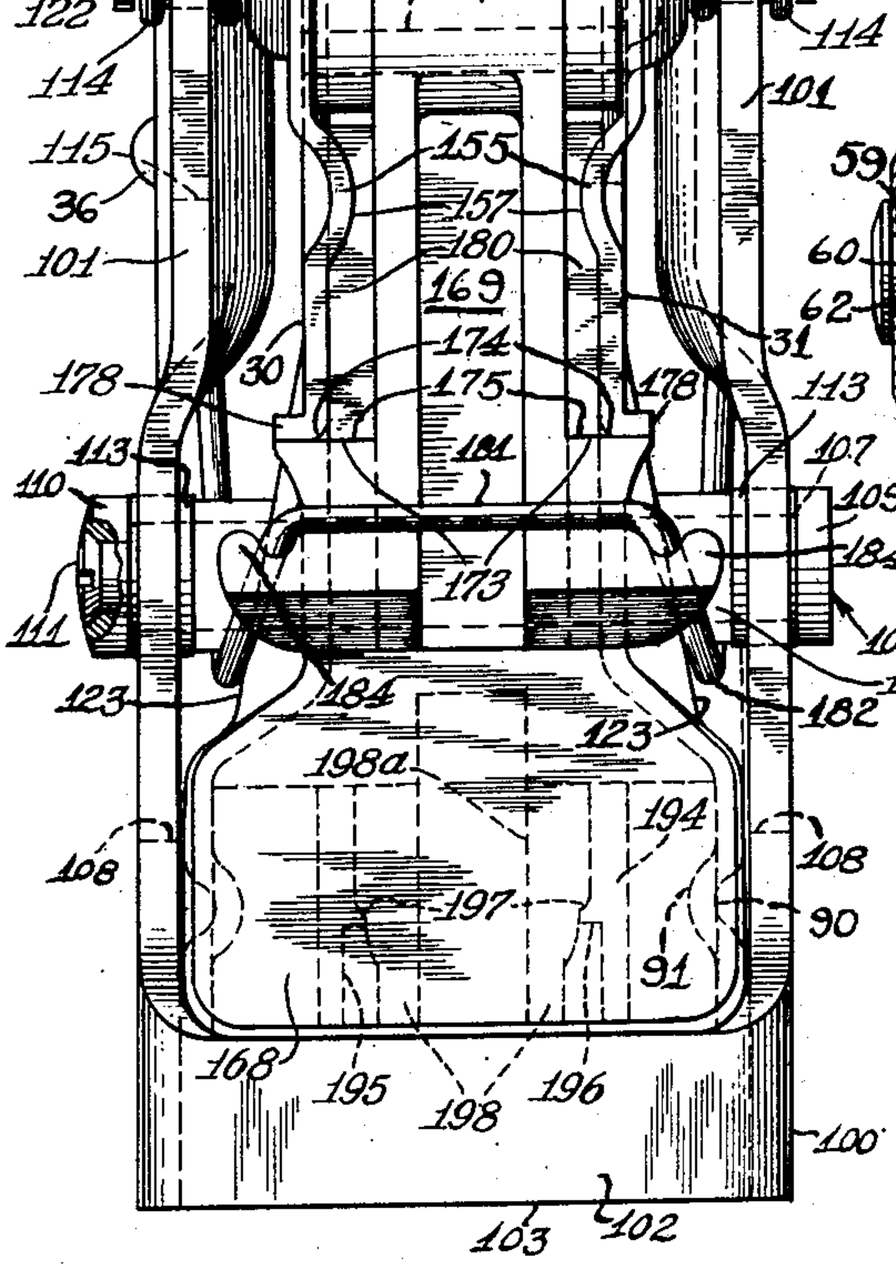
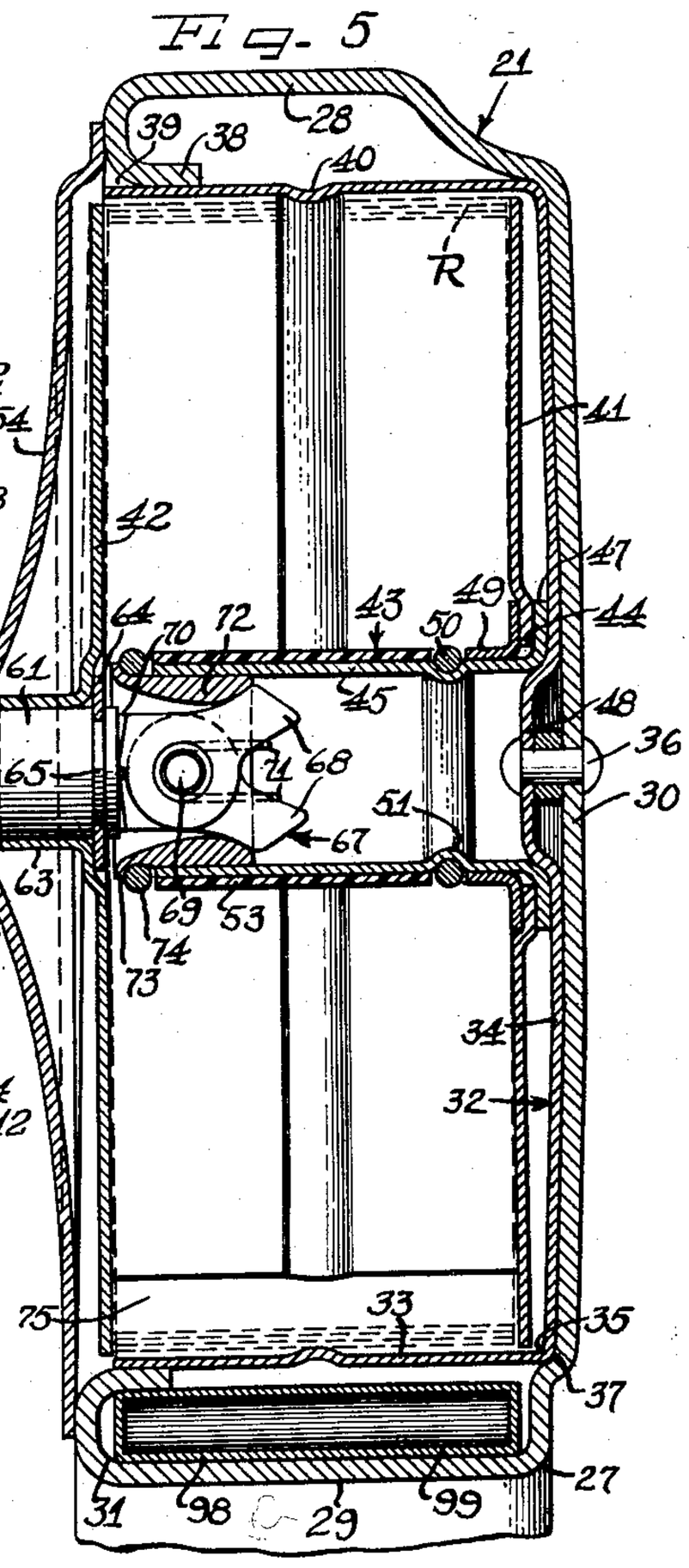


Fig. 5



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HAMMER STAPLER

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Fig-6

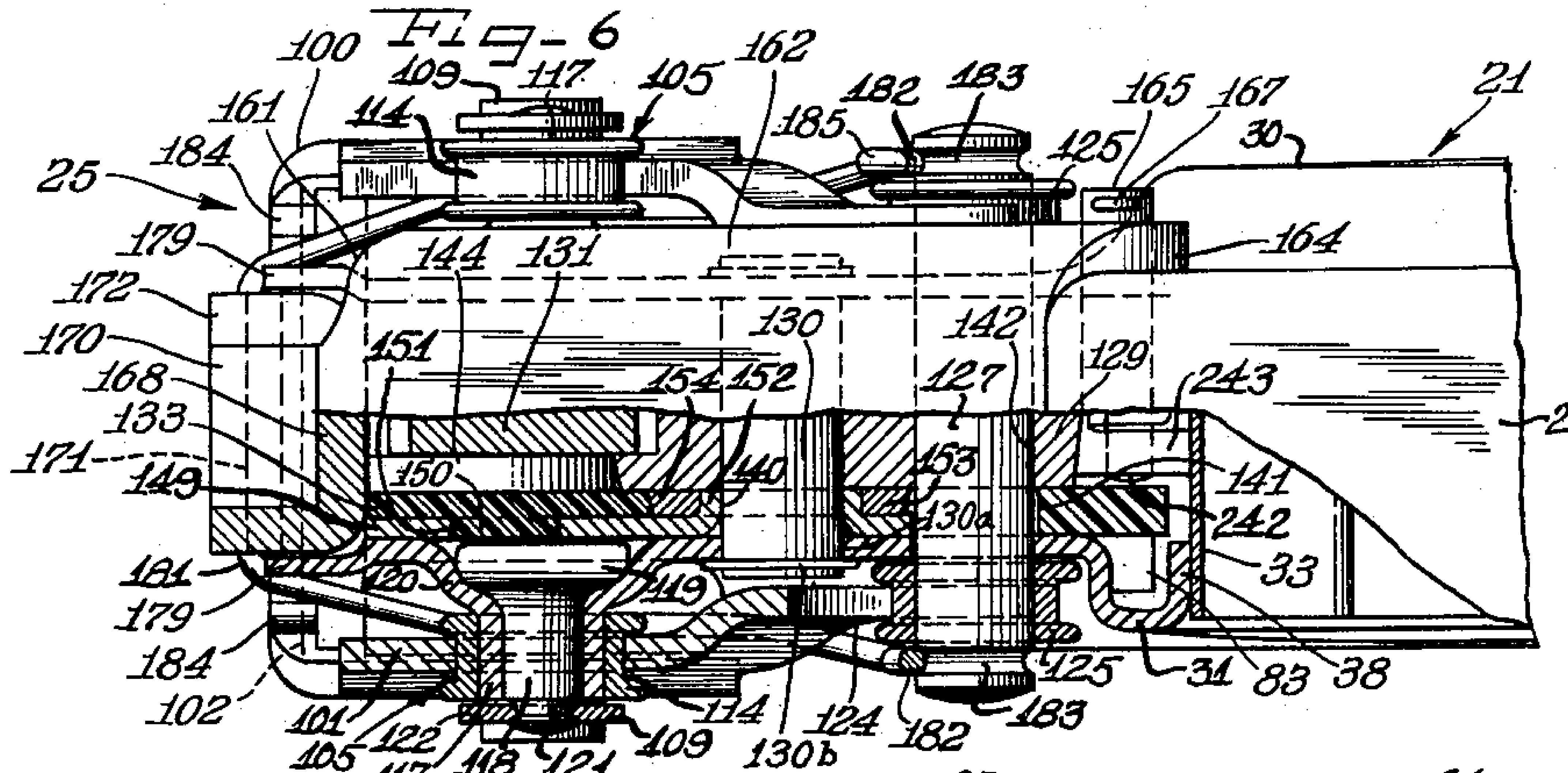


Fig-7

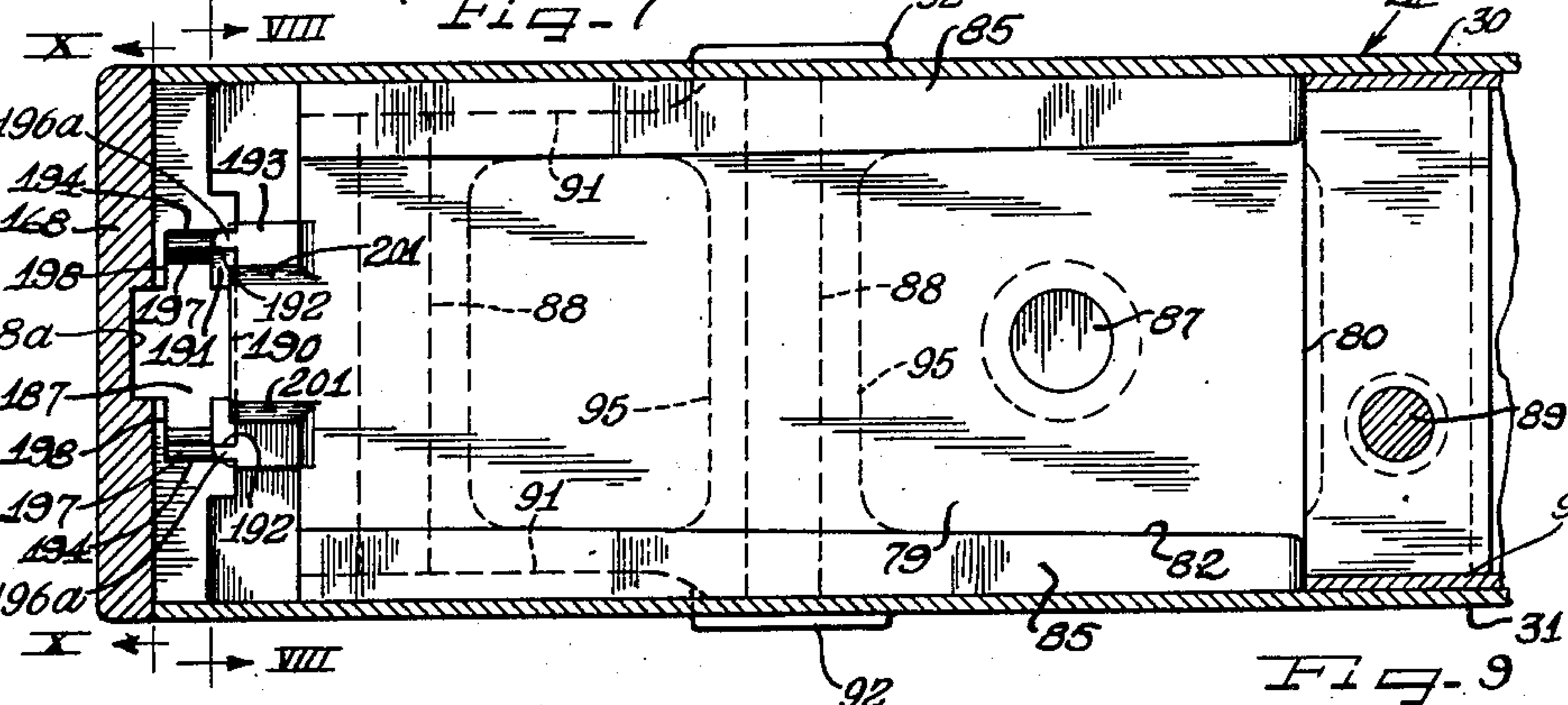


Fig-8

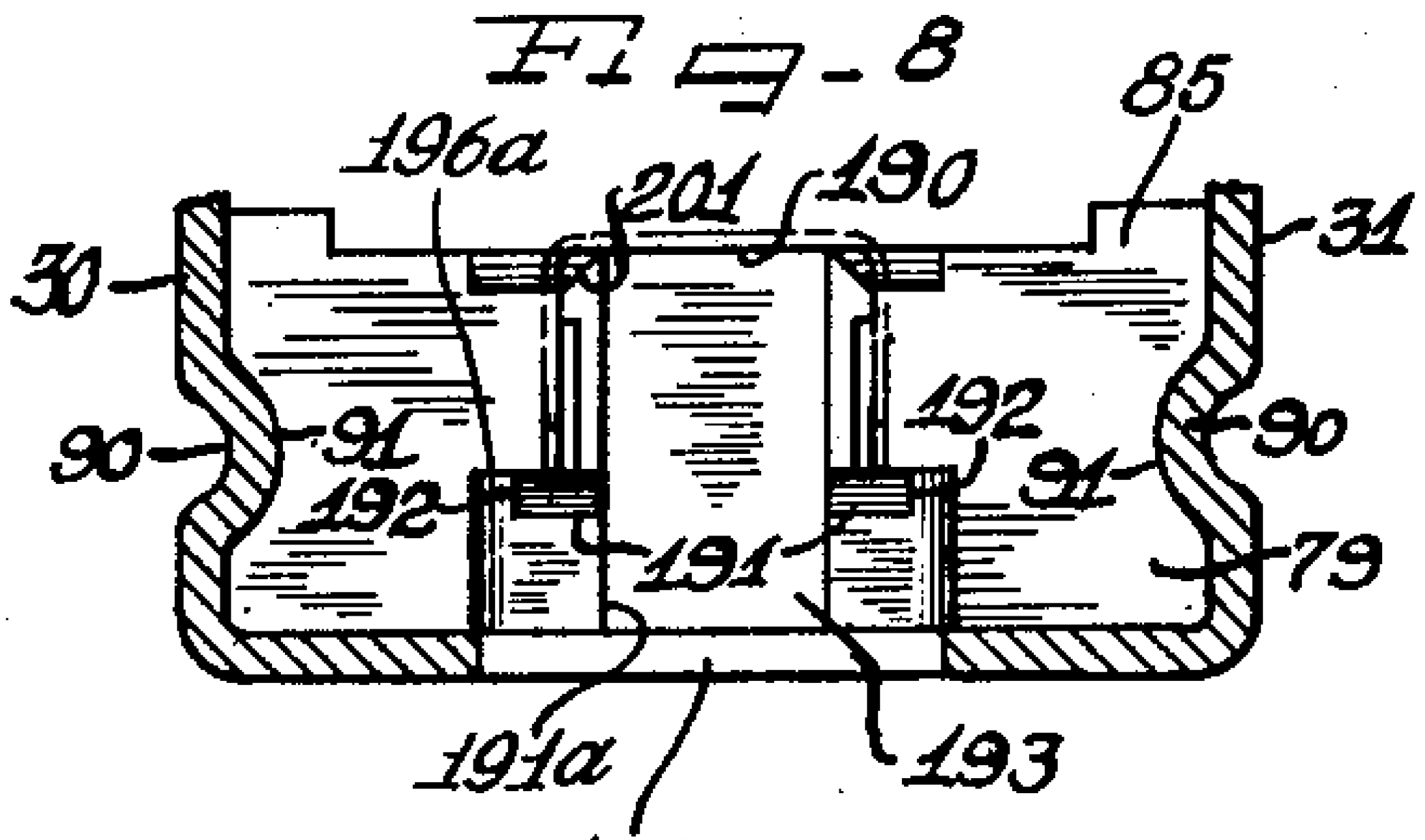
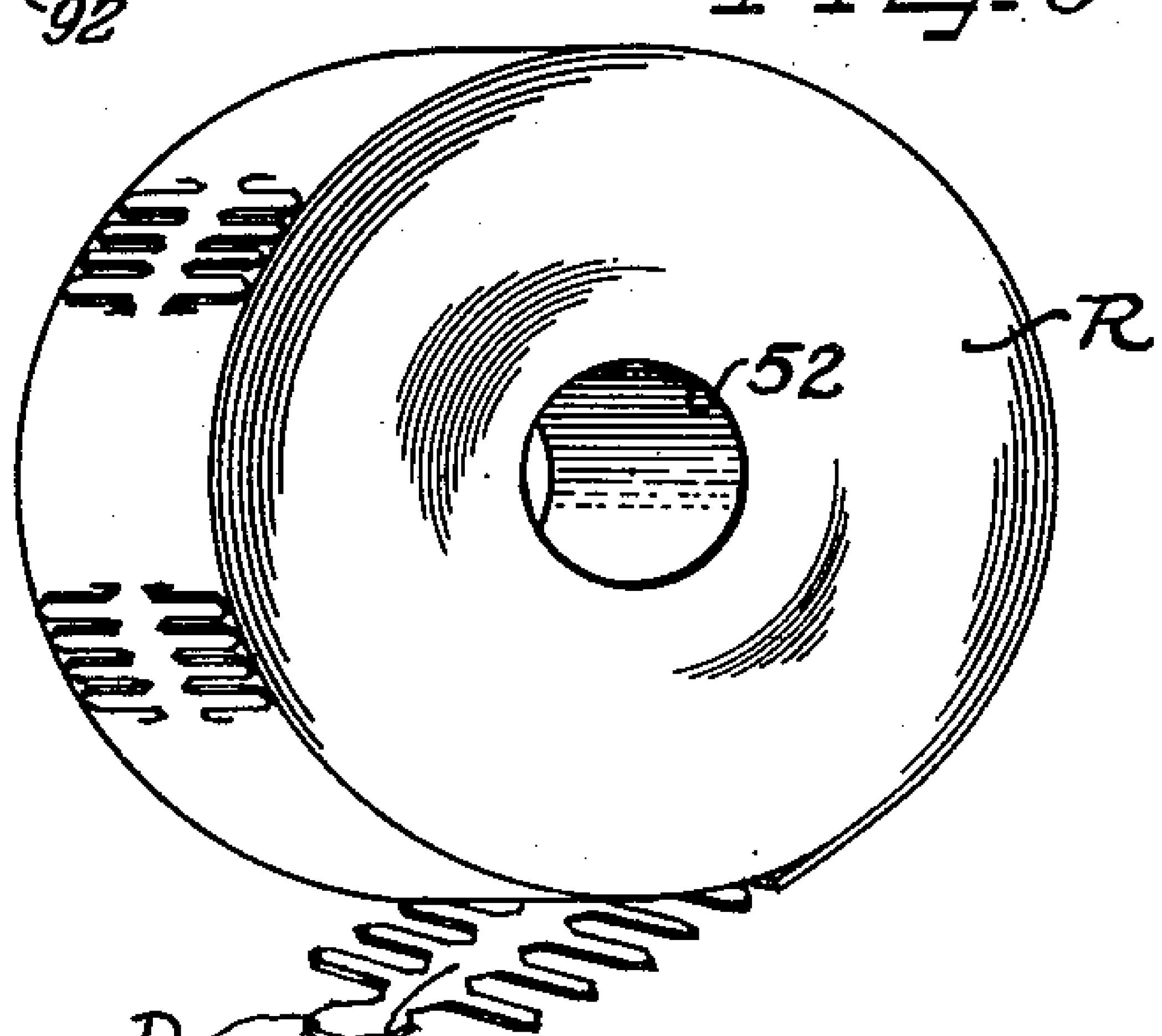


Fig-9



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HAMMER STAPLER

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Fig. 11

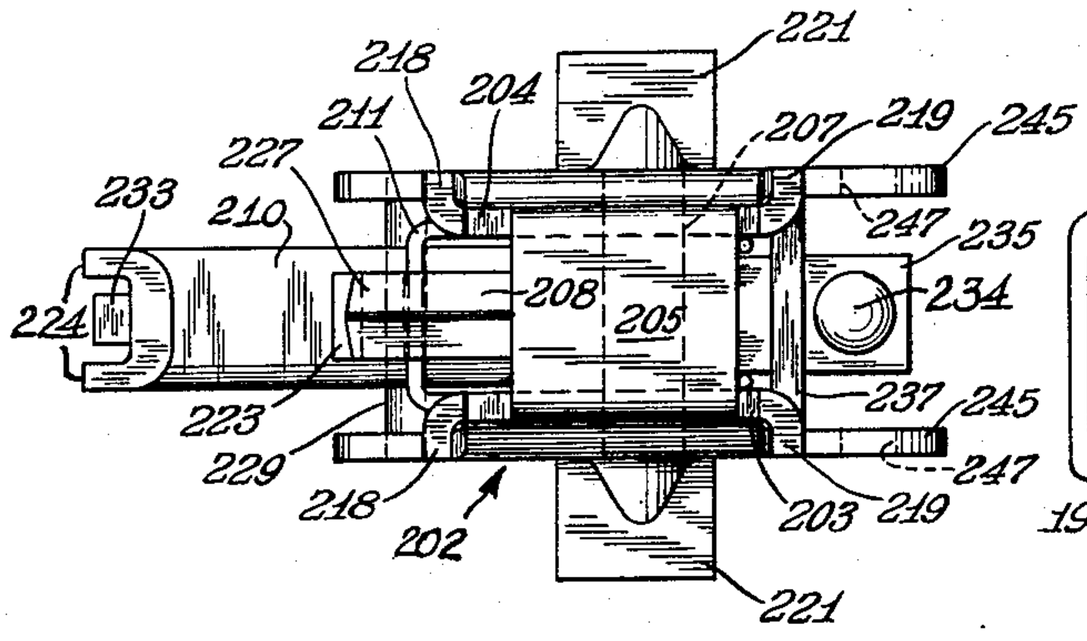


Fig. 10

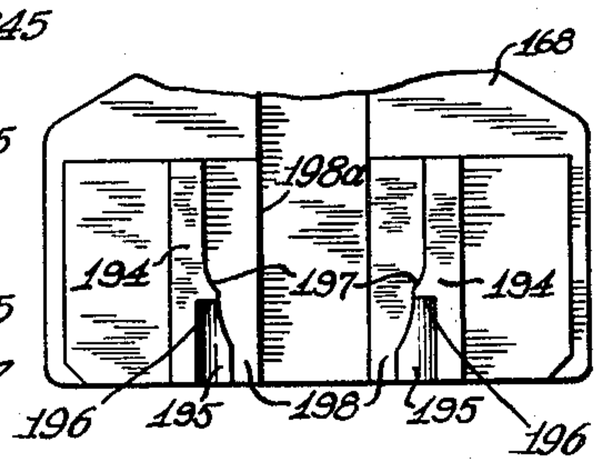


Fig. 12

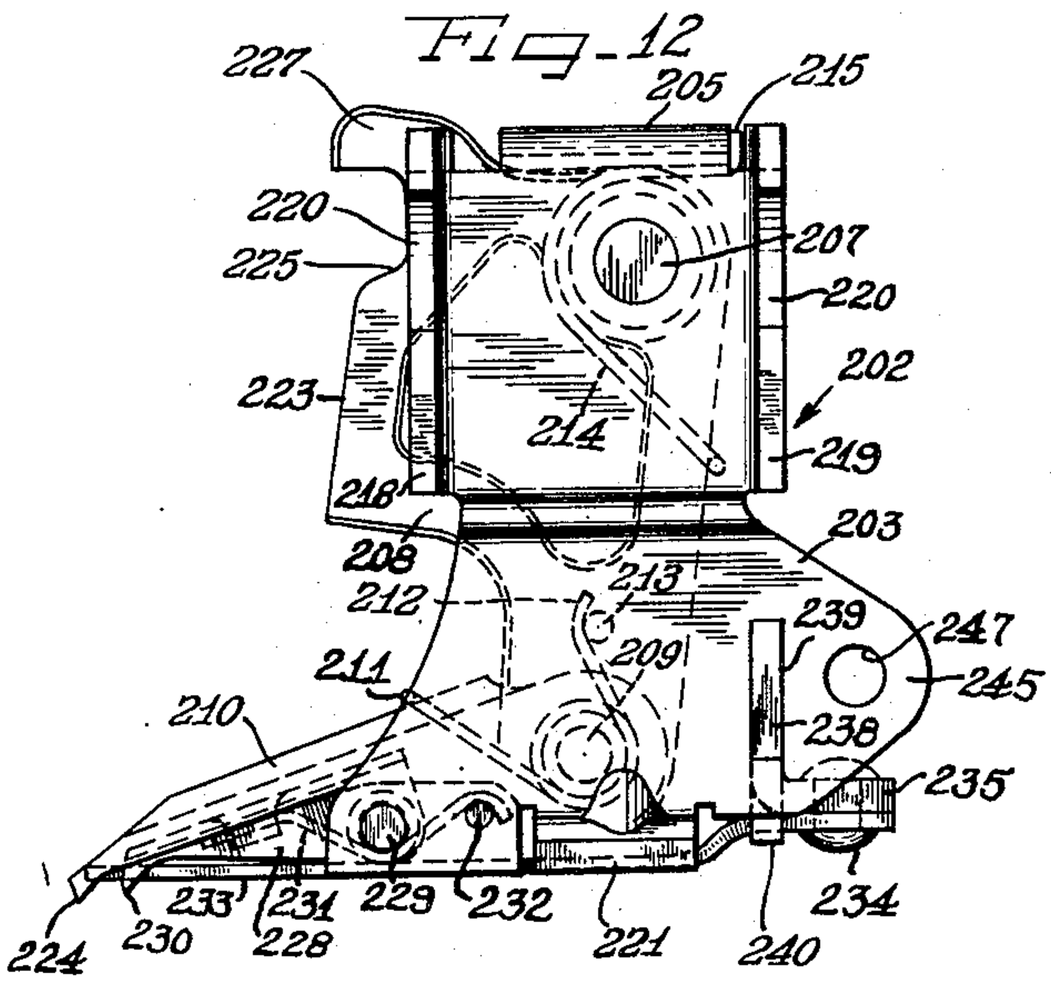
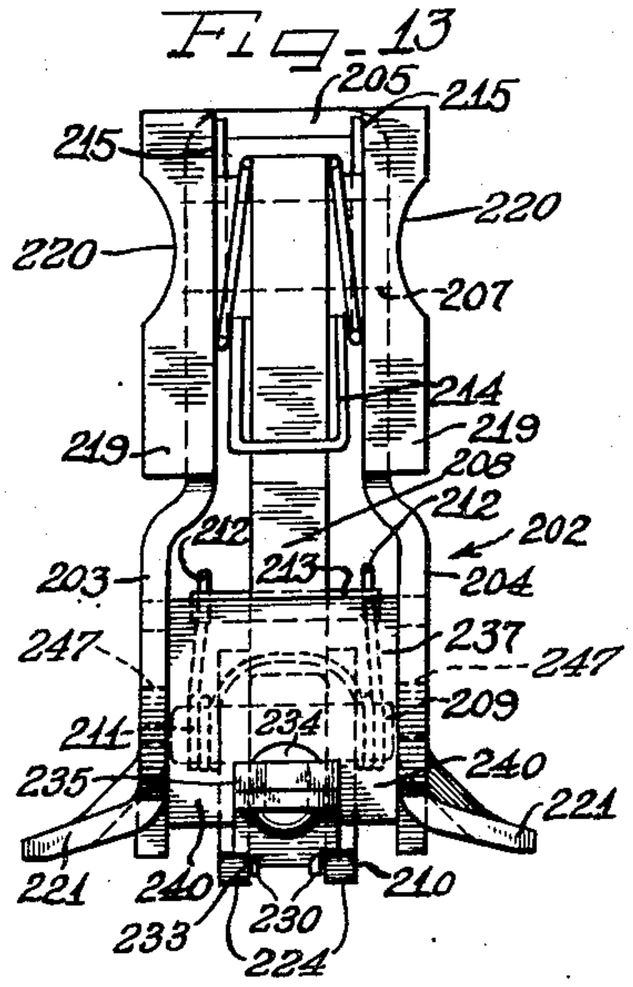


Fig. 13



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HAMMER STAPLER

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Fig. 14

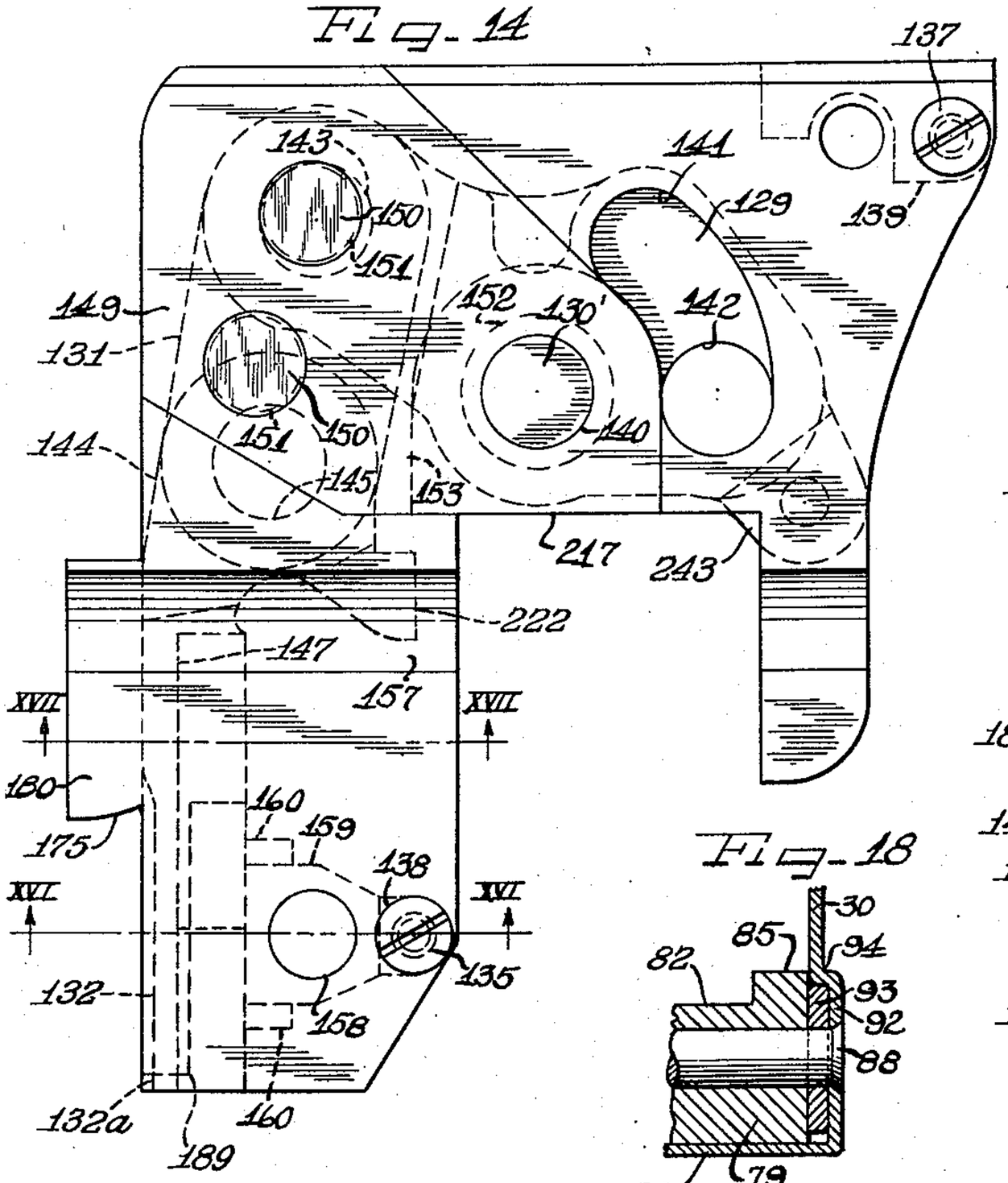


Fig. 15

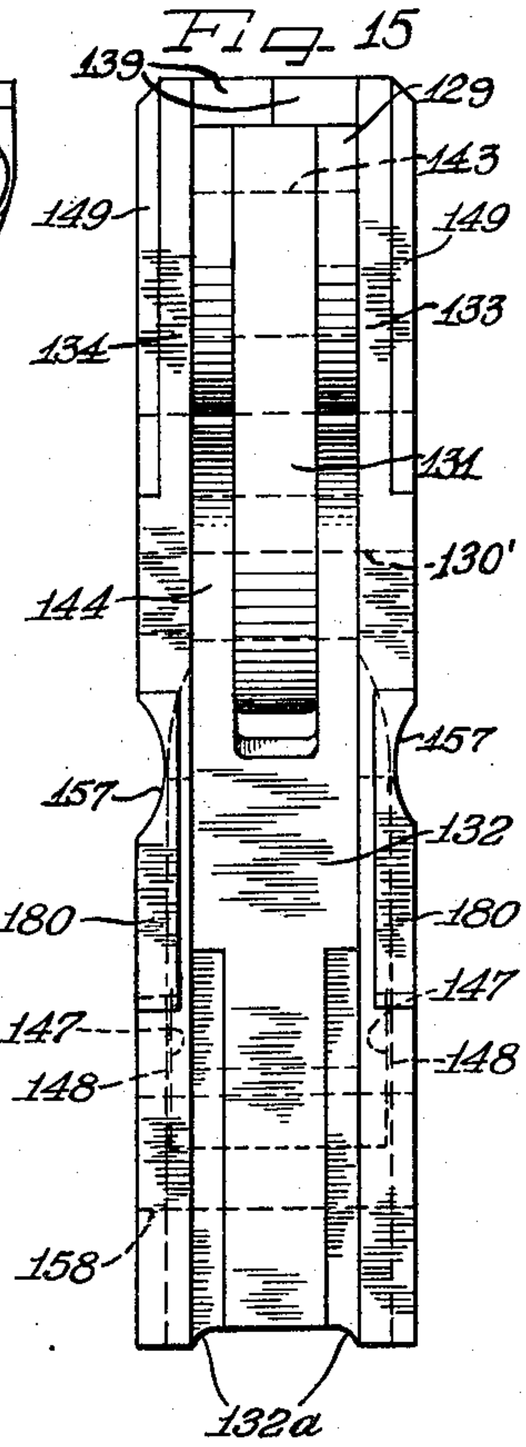


Fig. 18

Fig. 16

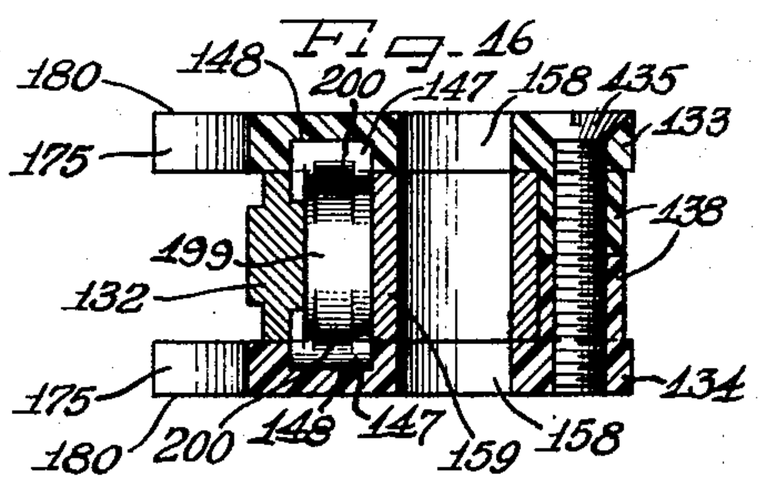
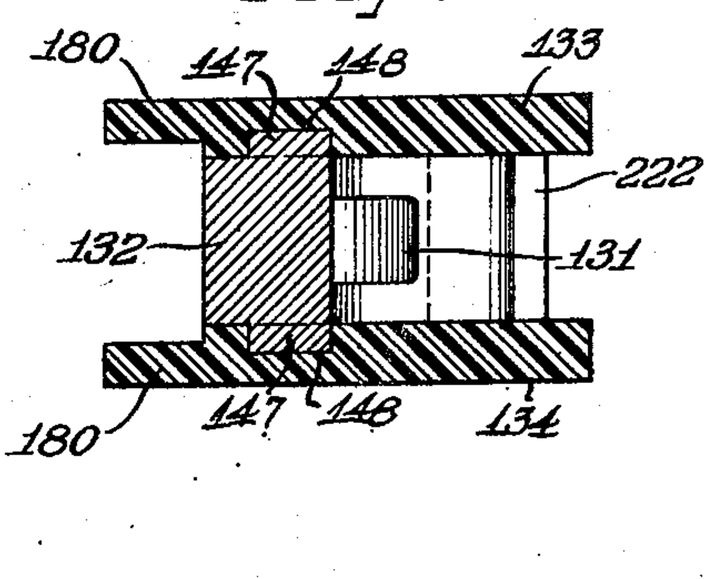


Fig. 17



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UNITED STATES PATENT OFFICE

2,653,316

HAMMER STAPLER

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Application October 28, 1950, Serial No. 192,762

37 Claims. (Cl. 1—48.1)

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The present invention relates to improvements in stapling devices and more particularly concerns a hammer stapler.

Among the more important objects of the invention is the provision of a hammer stapler capable of carrying a substantiial roll of partially formed sheet metal staples from which individual staples are successively formed and driven in the use of the stapler.

Another object of the invention is to provide in a hammer stapler improved means for forming and driving the staples.

A further object of the invention is to provide in a stapling machine an improved construction including a plurality of unitary subassemblies whereby a staple driving and a staple feeding unit are arranged in the form of cartridge subassemblies that can be easily and quickly assembled in a supporting casing or removed when desired, thus greatly facilitating servicing or repair of the machine whenever required.

Still another object of the invention is to provide an improved hammer stapler embodying various novel features in structural relationships which will provide extreme sturdiness, durability and efficiency together with light weight.

Yet another object of the invention is to provide a hammer stapler capable of carrying an unusually large load of staple blanks in a magazine so disposed that not only does it assist in the handling of the device for driving staples but also places the staple load well forwardly in the machine so that the center of mass is as near as practicable to the driving head of the machine.

A still further object of the invention is to provide an improved staple forming and driving assembly for a hammer stapler.

An additional object of the invention is to provide an improved staple blank handling and feed mechanism for a hammer stapler.

It is also an object of the invention to provide an improved retaining gate mechanism at the front of a hammer stapler.

A yet further object of the invention is to provide an improved staple guide and forming anvil structure for a hammer stapler.

In addition it is an object of the invention to provide an improved magazine structure for a hammer stapler.

Also an object of the invention is the provision of an improved body and handle structure for a hammer stapler.

Other objects, features and advantages of the present invention will be readily apparent from

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the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmental top plan view of a hammer stapler according to the invention;

Figure 2 is a fragmental side elevational view of the hammer stapler;

Figure 3 is an enlarged fragmental longitudinal sectional elevational view taken substantially on the line III—III of Fig. 1;

Figure 4 is an enlarged front or head end elevational view of the hammer stapler;

Figure 5 is an enlarged vertical sectional view through the magazine of the hammer stapler taken substantially on the line V—V of Fig. 2;

Figure 6 is an enlarged top plan view of the head end portion of the hammer stapler and partially in section taken substantially on the line VI—VI of Fig. 2;

Figure 7 is an enlarged fragmentary horizontal sectional view taken substantially on the line VII—VII of Fig. 3;

Figure 8 is a fragmentary vertical sectional view taken substantially on the line VIII—VIII of Fig. 7;

Figure 9 is an isometric, more or less schematic view of a roll of sheet metal staple blanks of the kind which are adapted to be used in the hammer stapler of the present invention;

Figure 10 is a fragmentary elevational view of the inside face of the lower portion of the front gate member of the stapler, looking generally in the direction of the arrows on the line X—X of Fig. 7;

Figure 11 is a top plan view of the staple blank strip feed unit;

Figure 12 is a side elevational view of the feed unit;

Figure 13 is a rear elevational view of the feed unit;

Figure 14 is a side elevational view of the replaceable staple driving and forming unit;

Figure 15 is a front elevational view of the driver and forming unit;

Figure 16 is a sectional detail view taken substantially on the line XVI—XVI of Figure 14;

Figure 17 is a sectional detail view taken substantially on the line XVII—XVII of Figure 14; and

Figure 18 is an enlarged fragmentary sectional detail view taken substantially on the line XVIII—XVIII of Fig. 2.

It is believed that the present invention provides the first hammer stapler to depart from the capacity limitations of prior staplers in which

reliance was placed upon individual sticks or lengths of staples fed into the machine and limited as to length by the length of the staple magazine. This has necessitated frequent reloadings. By the present invention a hammer stapler is provided which is adapted to be loaded with staple blanks in a practical instance up to 1500 to 2000 units. Such staple units are adapted to be in the form of partially formed flat staple blanks **20** (Fig. 9) formed successively in a sheet metal strip supplied in a roll R of the desired quantity or size and which may be conveniently supplied and handled for insertion in the hammer stapler wherein the individual staple units **20** will be successively formed, severed from the leading end of the strip and driven from the machine into an object or surface into which the staple prongs are to penetrate.

General description of the hammer stapler

According to the invention, the sammer stapler comprises a body **21** which is preferably formed from sheet metal stampings of any desired number of complementary parts brazed or welded together to provide a strong, light weight and durable body member and a casing or housing within which the staple roll R and the various feeding and driving mechanisms are housed. In a practical form, the housing or body member **21** has been made of two major parts, a left hand and a right hand part stamped to form and then welded together edgewise along upper and lower marginal flanges into a single integral unit.

The rear end portion of the body member **21** is substantially elongated and appropriately shaped to provide a handle **22** of suitable length to be grasped in the hand of a user. The rear extremity of the handle is appropriately finished off by means of a knob-like tip or plug member **23** which closes the end of the handle shell and has a downwardly projecting retainer nose **24** which will prevent rearward slipping of the user's hand from the handle in service. The handle tip member **23** may be formed from a suitable light weight metal such as aluminum or it may be formed as a molded plastic element.

Intermediate the handle **22** and the forward extremity portion of the body **21** of the hammer stapler and which forward extremity portion provides a staple feeding, forming and driving head **25** containing most of the active mechanism of the device, is provided an enlarged staple blank roll magazine **27**. For practical reasons the magazine portion **27** of the housing is disposed as close as practicable to the head portion **25** of the stapler and is as large vertically as practicable in order to house a staple blank strip roll R of as large a diameter as feasible so that a maximum number of staple blank units **20** can be loaded into the machine at any one time. In this manner, not only is the capacity of the machine at a maximum, but the mass distribution of the machine, implemented by the weight of the roll of staple blanks, is most efficient from a practical standpoint for a hammer type stapler, namely with the center of mass close to the driving tip of the hammer.

Supply magazine

Having special reference to Figs. 1, 2, 3 and 5, the magazine portion **27** of the body shell **21** includes a top wall portion **28** and a bottom wall portion **29** extending substantially right angularly to a side wall portion **30** at the right side of the assembly, considered when looking from

the handle end toward the head end of the machine, and a side wall **31** completing the body shell structure of the magazine portion or section of the device. The spacing between the opposing top and bottom walls **28** and **29** and the right side wall **30** and the opposing left side wall **31**, and the shape or configuration of the walls is dictated by dimensional requirements to receive a roll R of staple blanks and also to provide adequate reinforcement and stress resistance in the intermediate portion of the body casing **21** occupied by the magazine. It will be observed that the handle portion **22** of the body shell merges smoothly to juncture with the magazine encasing body section **27**.

Inasmuch as the strip of staple blanks **20** in the roll R presents numerous burred and otherwise rough edges or surfaces not only at the sides but also at the periphery of the roll, means are provided within the magazine section **27** for not only efficiently supporting the roll R in the hammer stapler but also to eliminate or at least minimize abrasion or frictional resistance to free unrolling of the roll as the staple blanks are used from the end of the staple blank strip. To this end, a cup-shaped liner **32** is porvided within the magazine section **27** having a generally circular wall **33** of an inside width or depth somewhat greater than the width of the staple blank strip in the roll R and an inside diameter sufficient to receive freely the roll R in the maximum diameter it may be supplied. Integral with the wall **33** is a back wall **34**. Juncture of the liner walls **33** and **34** is on a fairly sharply defined or small radius corner **35** with the back wall **34** bearing in face-to-face relation against and secured as by welding, brazing or by a central rivet **36** to the opposing surface of the housing wall **30**. Additional stability in assembly is attained by having the corner **35** fit in a complementary annular reentrant corner or seat **37** provided therefor in the inner surface of the housing magazine wall portion **30**.

By preference, the top and bottom walls **28** and **29** of the body shell are spaced substantially further apart than the diameter of the magazine liner wall **33** so as to lie in spaced relation thereto for, among other reasons, accommodating an inturned marginal housing flange **38** defining a circular opening **39** of a diameter to receive and support the outer margin of the liner wall **33** closely. There is thus provided by the magazine liner **32** a cavity defining a chamber opening toward the left side of the hammer stapler within which the supply roll R is accommodated.

In order to minimize frictional resistance or abrasion contact of the periphery of the roll R with the inner surface of the liner wall **33**, means are provided for limiting peripheral contact to a minimum. In an efficient and simple form, such means comprise an intermediate inwardly projecting substantially annular rib **40** formed on the liner wall **33** in substantially centered relation for engagement by the central body and connecting area of the staple blank strip which is free from the burrs resulting from stamping out of the stable blank **20** in the strip and which is of ample width to assure engagement with the peak of the spacer and friction eliminating rib **40**. By having the rib **40** relatively narrow and of arcuate cross section, substantially line contact is maintained between the solid central portion of the staple blank strip as long as any of the strip remains in the magazine and with substantial tolerance for limited transverse or rocking shift-

ing of the strip due to the inevitable variables encountered in such a strip.

Frictional resistance or burr abrasion from the points of the staple blanks which make up the sides of roll R is avoided by equipping the magazine with rotary anti-friction side plate structure comprising an inner or right side plate 41 and an outer or left side plate 42. By preference the inner plate 41 comprises part of a rotary reel or spool 43 on which the roll R is mounted in the magazine. For this purpose the plate 41 is centrally apertured at 44 to fit rotatably about a central tubular hub 45. At its inner end, the hub 45 is provided with a laterally extending flange 47 bearing against the opposing inner surface of the wall 34 of the liner cup which is formed with a central embossment 48 projecting into the base portion of the hub 45 for centering purposes. The flange 47 is fixedly secured to the liner wall 34 as by welding or brazing. Secured to the margin of the plate 41 defining the central aperture 44 is a hub flange 49 of generally L-shaped cross section effecting bearing engagement with the surrounded base portion of the hub 45 and retained against outward displacement on the hub 45 by a retaining ring 50 seated in an annular groove 51 in the hub. As a result, the inner anti-friction plate 41 is adapted to turn freely about the stationary hub 45 and is maintained in spaced relation to the liner wall 34 by the base flange 47 of the hub. It will be observed in Fig. 5 that the housing side wall 30 and the juxtaposed liner wall 34 are bulged or bowed outwardly to accommodate the thickness of the spacer and attachment flange 47 of the hub member. It will also be observed that the plate 41 is preferably formed to flare gradually slightly outwardly toward its perimeter so that while relatively close confinement of the inner portion of the staple blank roll R, indicated in dash outline in Fig. 5, against axial movement in the magazine is effected, increased freedom from binding is afforded toward peripheral margin of the retaining and anti-friction rotary plate 41.

In order to avoid wear and friction at the intermediate portion of the hub member 45 which projects into and through a core hole 52 in the roll R (Fig. 9) engaged thereon, an anti-friction sleeve 53 is provided about the hub and which sleeve is preferably made from a self-lubricating synthetic plastic material such as nylon. The sleeve 53 may be freely rotatable upon the hub 45 or it may be in press fit relationship thereabout, or even molded directly on the hub.

The circular anti-friction disk or plate 42 is mounted in appropriately spaced relation to the disk or plate 41 and adjacent to the outer edge of the liner wall 33. Since it is necessary to gain access to the magazine chamber to place a supply roll therein, the anti-friction disk 42 is mounted on the inner side of a closure member or door 54 constructed and arranged to close the magazine and to be opened for access thereinto. For this purpose the door 54 preferably comprises a sheet metal stamping marginally shaped to bear in closing relation against the body wall 31 about the opening to the magazine chamber and has a rearwardly extending hinge portion 57 appropriate hingedly mounted between spaced complementary hinge bosses 58 on the body shell 21 rearwardly from the magazine chamber opening. The central portion of the door panel 54 is bulged outwardly and has an aperture 59 through which

extends a reduced diameter portion 60 of an inwardly projecting stud post 61 secured to the door by upsetting or riveting an attachment head 62 over the outer margin of the door defining the opening 59. The stud member 61 serves as a hub or pintle bearing for an outturned central annular bearing flange 63 on the anti-friction disk 42. Retention of the disk 42 against axial displacement inwardly from the bearing stud 61 is effected by a retaining disk ring 64 locked in a groove 65 on an inner portion of the bearing stud. The construction and arrangement is such that the anti-friction disk 42 retoins the staple blank roll R in place within the magazine when the door 54 is closed, and the disk 42 is freely rotatable with the roll as the roll unwinds as an incident to use of the staple blanks. As seen in Fig. 5, the anti-friction disk 42 is also preferably angled uniformly outwardly from the center towards its periphery so as to afford greater clearance for the sides of the staple blank roll progressively to the periphery of the anti-friction disk so as to ease withdrawal of the staple blank strip from the periphery of the supply roll, similarly as explained in connection with the cooperating anti-friction disk 41.

For retaining the door 54 closed in service, a latch is provided which in the present instance comprises a snap latch 67. This comprises a pair of shouldered latch fingers 68 pivoted on a pin, stud or pintle 69 carried by an inward extension 70 on the disk bearing stud 61 to project into the outer end portion of the tubular hub member 45. The shouldered latch fingers 68 are biased by means such as oppositely tensioned arms 71 of a torsion spring into a separated condition for latching engagement with the inner end of a keeper ferrule 72 secured within the outer end portion of the tubular hub 45. The keeper member 72 provides a flaring throat defined at its outer end by a lateral flange 73 spaced autwardly from the end of the tubular hub 45 and providing with the hub end an annular groove within which is secured a retainer snap ring 74 serving as a retainer for the sleeve bushing 53 and also as a protection against damage of the outer end of the sleeve bushing by the side edge of a staple roll when the same is inserted on the magazine reel spindle or hub. It will thus be apparent that the door 54 is held closed by the latch 67 but can be pried open by overcoming the yieldable engagement of the snap latch arms or fingers 68 within the keeper ferrule 72. When the door 54 is closed, the latch 67 operatively snaps into latching relation within the keeper ferrule 72.

From the magazine, the outer end portion of the strip of staple blanks is fed from the supply roll through a gap 75 (Figs. 3 and 5) in the lower forward portion of the liner wall 33 toward the forward or forming and driving head end of the stapler. For this purpose, the lower forward portion of the liner wall 33 is split and a lower forwardly directed flange portion 77 provides a ramp for egress from the magazine. At the upper side of the gap 75 a short flange portion 78 of the side of the liner wall is turned downwardly and forwardly arcuately as a deflector lip.

Strip guide and anvil structure

Leading forwardly from the ram 17 is a strip guide and anvil member 79 which may be constructed as a one piece steel forging (Figs. 2, 3, 7 and 8). Adjacent its rear end, the member 79 has a rabbet step recess 80 within which the ramp flange 77 and an underlying lamination

portion 81 of the body shell flange 38 are received. Forwardly from the tip of the ramp flange 77, the member 79 is provided with a longitudinal upwardly opening channel 82 of a width to receive the staple blank strip horizontally therein to be fed forwardly therethrough to the forward or driving end of the driving head portion of the stapler. At its rear end the channel 82 is wider than at its front end and the channel gradually tapers forwardly to a side clearance which closely approximates the total width of the staple blank strip to properly center the strip at the forming and driving station of the machine. However the rear portion of the guide channel is slightly wider so as to afford greater clearance and thus eliminate any possible binding or resistance to forward movement of the strip as it is drawn from the magazine.

Inasmuch as the staple blank strip when it comes from the roll in the magazine has a tendency to curl up conformable to its roll curl, means are provided at the entrance or rear portion of the channel 82 to restrain the upwardly curling tendency of the strip and hold it down in the channel. Herein such means comprises a roller 83 mounted on a pin or axle 84 supported between the side walls of the housing shell above the rear end portion of the channel 82 and with the periphery of the roller dipping into the channel. By preference the roller 83 is made from an appropriate plastic material such as nylon. Thus, when a new supply roll is inserted in the machine and the leading end portion is threaded from the magazine into the guide channel 82, the roller 83 facilitates the threading operation by holding the end portion of the strip down in the channel as it is threaded forwardly. It should also be noted that in order further to reduce frictional resistance to forward movement of the strip, the channel 82 is intermediately deepened as best seen in Fig. 3 immediately forwardly from the hold down roller 83 so as to accommodate the downwardly buckled shape of the strip which will persist due to the curled set of the material in the roll and until the strip is straightened out adjacent to the forming and driving station as will be more fully described hereinafter.

The sides of the guide channel 82 are defined by a pair of longitudinal flanges or curbs 85 which are disposed in a common top plane.

The anvil and guide member 79 serves in addition as a bottom reinforcement for the head portion of the machine and for this purpose is constructed to fit closely between the forward extensions of the side walls 30 and 31 of the housing shell and to engage against the forward extension of the lower wall 29 of the housing. Permanent attachment of the block member 79 is effected by means such as a rivet 87 securing the rear channeled portion of the guide block to the lower wall 29 while a plurality of transverse rivets 88 secure the forward portion of the block to the side walls 30 and 31. At the rear rabbeted extremity of the guide block a rivet 89 secures the laminated flanges 77 and 81 not only to the guide block but through the guide block to the lower housing wall 29. Additional attachment to the housing is effected at the forward end portion of the block 79 by the interconnection of a respective pressed in longitudinal rib 90 in each of the side walls 30 and 31 in a complementary groove 91 in the respective opposing side of the block. In this way the bottom forward portion of the machine is greatly resistant to impact as will occur repeatedly in the use of the hammer stapler. Distribution of impact stress from the bottom of the unit to the side walls 30 and 31 is implemented by the provision of outward embossments 92 in the side walls 30 and 31 at the place where the rearmost transverse rivet 88 is secured therethrough to afford a space from the adjacent side of the block 79 (Fig. 18) within which an impact stress distribution washer 93 is disposed about the rivet 88 and dimensioned to be in snug edgewise engagement with a shoulder 94 provided by the offsetting of the embossment 92. Thereby impact stresses against the bottom of the block 79 are distributed in shear through the rivet 88 not only to the respective engaged portions of the side walls 30 and 31 but also through the washers 93 to the walls 30 and 31 (Fig. 18).

Inasmuch as it is desirable to maintain the total weight of the hammer stapler to a minimum consistent with durability, the strip guide and anvil block 79 is formed in its undersurface with a series of cavities 95. However this leaves the underlying portions of the lower wall 29 of the housing without direct reinforcement by the block against deformation as a result of impacts thereagainst. To remedy this, the cavities 95 are filled with a light weight highly resistant material of which nylon has been found to be quite satisfactory. This material lends itself readily to molding directly into the cavities 95 and has high resistance to deformation due to impacts thereagainst while affording a certain amount of cushioning and being exceptionally light in relation to its mass. The plastic cavity fills are identified at 97.

In order to reinforce the bottom wall 29 rearwardly from the guiding and reinforcing anvil block 79 and under the staple blank roll magazine, reinforcing means are interposed between the bottom wall 29 and the inturned flange 38 (Figs. 3 and 5) and in the present instance comprising a sheet metal reinforcing tube 98 of rectangular cross section and dimensioned to fit snugly in the space between the bottom wall 29 and the flange 38. At intervals, the top wall of the tube 98 is depressed to provide a reinforcing strut 99 bearing against and secured as by welding to the bottom wall of the reinforcing tube. At its forward end, the reinforcing tube 98 is secured to the rear end of the block 79 by embracing the rear extension extremity of the block and utilizing the rivet 89 to secure the tube to the block under the flange laminations 77 and 81. The lower portion of the forward end of the reinforcing tube member 98 is secured by the rivet 89 between the lower wall 29 of the housing and the undersurface of the rear extension of the guide block which for this purpose may be rabbeted or recessed sufficiently to accommodate the reinforcing tube wall closely. The forward end portions of the side walls of the reinforcing tube 98 are preferably received closely between recess portions of the rear extension of the block and the side walls 30 and 31, as best seen in Fig. 7.

Staple forming, cut-off and driving mechanism

At the forward end of the anvil block 79, each successive staple blank 20 at the leading end of the staple blank strip reaches the forming, cut-off and driving station in the hammer stapler and means are provided which are responsive to impact against the surface of the object into which a staple is to be driven for severing and driving the leading end staple blank which by this time has been fully formed into the conventional U-shaped staple form, and in the same action U-shaping the next succeeding staple blank. Externally of the machine, such means

comprise a striker 100 (Figs. 1, 2, 3, 4 and 6). The function of the striker 100 is to receive the full force of the impact of a staple driving blow directed against the object to receive the staple by manipulation of the hammer stapler and thereby activate the mechanism which actually forms, shears and drives the staple. For this purpose, the striker 100 comprises a hardened metal member which normally projects below the driving head portion 25 of the machine and is reciprocable in an up and down direction responsive to the impact of a staple driving blow and subsequent lifting of the machine away from the stapled surface. In a preferred form, the striker 100 is made from a suitable heavy gauge sheet steel stamped to form and subsequently hardened and comprising spaced wings or side walls 101 lying in assembly at the opposite sides of the driving head end portion 25 of the machine and integrally joined together in one piece by a lower front yoke web portion 102. The lower edges of the striker sides 101 and the connecting web or bar 102 are preferably disposed in a common plane and provide a striker surface of generally U-form when the striker is viewed from its lower end.

Each of the striker side walls 101 is of a length to extend substantially upwardly along the sides of the head end of the machine and is guided for vertical reciprocation by means comprising a lower anti-friction and guide assembly 104 and a spaced upper anti-friction and guide assembly 105.

The lower striker guiding means 104 (Figs. 2 and 4) comprises a pin 107 extending through vertically elongated respective apertures 108 in the side wing portions 101 of the striker and transversely through the driving head end portion of the machine. One end of the pin 107 has an enlarged retaining head 109 while the opposite end of the pin is equipped with a removable retaining disk or collar 110, detachably held in place by means such as a screw 111 secured into the contiguous end portion of the pin. Supporting bearings for the pin 107 are provided by respective oppositely outwardly projecting hollow bearing bosses 112 respectively formed integral with the side walls 30 and 31 of the housing shell and disposed in coaxial alignment. Respective rollers 113 are preferably disposed between the ends of the bearing bosses 112 and the respective adjacent inner sides of the retaining head 109 and the collar 110. The width of the slots 108 is slightly greater than the diameter of the rollers 113 so that free riding movement of the edges defining the slots on the rollers is permitted during reciprocations of the striker 100. The length of the slots 108 is so related to the range of desired reciprocal movement of the striker to permit full retraction of the striker during a staple driving impact and subsequent extension of the striker to a desirable distance below the lower wall of the hammer stapler housing.

Since in the operation of the striker 100, there is some tendency toward rocking thereof about the guide pin 107, the upper guide assembly 105 is preferably equipped to afford substantial anti-friction relief. Accordingly the guide assembly at each side of the housing may be constructed substantially identical and in each instance comprises a freely rotatable grooved roller 114 (Figs. 1, 2, 4 and 6) cooperatively related to the upper portion of the respective striker side wall 101 within a vertical upwardly opening slot 115. The diameter of the bottom of the groove in the respective rollers 114 and the spacing between the vertical edges defining the slots 115 is such as to afford a fairly close relationship but yet ample clearance to permit a very slight rocking of the striker to an extent wherein only one of the vertical edges defining the respective slots 115 engages the roller at any one time.

Each of the rollers 114 (Fig. 6) is freely rotatably mounted on a journal boss 117 formed to project outwardly from the respective side wall 30 or 31, as the case may be, and having a cylindrical journal end portion upon which the roller is freely rotatable. Retention of the rollers 114 is effected by means such as respective retaining studs 118 having enlarged respective base portions 119 seated in a base enlargement 120 of the respective journal boss 117 providing a socket therefor. The stud 118 projects endwise beyond the end of the journal boss 117 and has an annular groove 121 in the end portion within which a snap-on split retaining disk annulus 122 is secured. In this manner the respective rollers 114 are retained within axial limits by the retaining disk or washer 122 and the bulging stud socket base portion 120 of the tubular journal boss 117.

As best seen in Fig. 4, the side walls 30 and 31 of the housing body shell are substantially more closely spaced in the head portion 25 of the device forwardly of the magazine section 27 and above the portions thereof engaging the anvil block 79 whereby to provide substantial clearance between the opposing side wing portions 101 of the striker, and the laterally projecting guide assembly bosses 112 and 117 on the side walls of the housing maintain the spaced relationship.

In order to reinforce the side walls above the laterally spread lower portions thereof in the head portion of the device, vertical juncture reinforcing ribs 123 are preferably formed at each side.

Opening rearwardly from the upper portion of the side flange or wing portions 101 of the striker are respective similar slots 124, preferably formed in upper rearwardly extending portions of the striker sides and which portions are preferably inset relative to the remainder of the respective striker sides and in parallel planes, as best seen in Figs. 1 and 4. Within the slots 124 are engaged respective grooved rollers 125 (Figs. 1, 2 and 6) rotatably carried by opposite end portions of a pin or shaft 127 by which an operating connection is effected between the striker 100 and the internal staple-forming, severing and driving mechanism. To this end, the shaft 127 extends transversely through the rear portion of the head section 25 of the machine and is accommodated for upward and forward components of movement in arcuate clearance apertures 126 in the respective side walls 30 and 31 of the housing as the shaft 127, responding to actuation by the striker 100, causes an actuating lever 129 to rock about a pivot 130 (Figs. 2, 3 and 6). The relative positions assumed by the rollers 125 and the shaft 127 in the extended at rest condition of the striker 100 and the protracted or impact-responsive, staple-driving condition of the striker 100 are indicated in the full line and dot-dash line positions, respectively, in Fig. 2. It will be observed that as the roller, shaft assembly 125, 127 moves upwardly and forwardly, the rollers 125 shift forwardly in the respective slots 124 in the striker, the opposite horizontal edges of which are parallel and operatively engage with the associated rollers 125 in the operations of the device.

By reason of the three-point anti-friction sup-

port of the striker, with the supports or guides 104 and 105 lying in a vertical plane close to the front of the striker and the operating shaft and roller support 125, 127 lying diagonally in line with the striking point substantially rearwardly spaced from the support 105, an advantageous leverage relationship is provided. This results in substantial balancing of striking force stresses due to the short lower striking lever arm and the relatively long upper driver-actuating lever arm having as fulcrum the pin 107 which at maximum impact force intervenes between the striking point and the driver actuating shaft 127.

The forming, severing and driving unit

As best seen in Figs. 3, 6, 14 and 15, the actuating lever 129 is preferably mounted in what may be termed a "package unit" together with a connecting link 131 and a forming, severing and driving member 132 between a pair of spaced parallel supporting and guiding plates 133 and 134, in such manner that the entire unit can be inserted into or removed as a unit with respect to the head section 25 of the machine.

The side plates 133 and 134 are preferably substantially alike but in complementary relation and formed of the same outline so that in the assembly while there are differences to the extent that the plate 133 provides the left side of the unit and the plate 134 provides the right side of the unit all of the structural features are the same. The plates are secured coextensively in parallel relation by means of a screw 135 securing the lower portions of the plates together and a screw 137 securing the upper portions of the plates together. Opposing contacting coaxially apertured spacer bosses 138 (Fig. 16) space the side plates properly apart at the screw 135, while opposing contacting spacer bosses 139 space the upper portions of the plates apart at the screw 137. The bosses 138 and 139 are preferably formed integral in one piece with the respective plates 133 and 134.

Pivotal support for the lever 129 is afforded by a temporary pivot pin 130' supported in respective pivot pin apertures 140 coaxially disposed in the side plates 133 and 134. Clearance for the actuating pin or shaft 127 is afforded by arcuately shaped respective apertures 141 in the side plates 133 and 134, in assembly registering with the apertures 128 in the respective housing side walls 30 and 31. A bearing aperture 142 in the lever 129 registers with the clearance apertures 141 and affords a sliding bearing fit for the actuating pin or shaft 127.

The temporary pivot pin 130' provides a fulcrum for the lever 129 which is disposed forwardly from the actuating shaft axis a shorter distance than the axis of a pivot pin 143 by which the link 131 is connected to the lever 129. It will be observed that the pivot pin 143 is disposed forwardly and upwardly adjacent the forward end of the lever 129 with respect to the pivot pin 130, and that the forward end of the lever is bifurcated so that the link 131 is slidably mounted between the forward end bifurcations of the lever. Through this arrangement, it will be clear that relatively smaller arc of movement of the actuating shaft 127 will effect a relatively longer arc of movement of the pivot pin 143 by reason of the differential in the arms of the lever from the fulcrum or pivot pin axis of the lever.

The link 131 projects downwardly and forwardly from the forward end of the lever 129 and is received slidably in a bifurcated head 144

at the upper end of the plunger or driving member 132, a pivot pin 145 connecting the link in the head. From this connection the driving member 132 extends reciprocably downwardly within the forward margins of the side plates 133 and 134 of the assembly. As a result, rocking movements of the lever 129, effected by the striker 100 to carry the rear end portion of the lever upwardly and the forward end portion downwardly causes the driver 132 to be driven, through the transmission medium of the link 131 downwardly, while reverse rocking of the lever 129 causes reverse movement of the connected parts.

The driver 132 is guided for vertical reciprocal movement between the forward margins of the side plates 133 and 134. For this purpose the sides of the driver are provided with respective longitudinal keying ribs 147 longitudinally slidably bearinged in respective vertical guide grooves 148 in the opposing faces of the side panels 133 and 134 (Figs. 16 and 17). The construction and relationship is preferably such that the front surface of the driver 132 is disposed substantially flush with the front edges of the side panels 133 and 134.

By preference, the side plates 133 and 134 are made from an easily machined, or molded, self-lubricating plastic material such as nylon. By the use of such material long, wear-free life for the unit is assured since friction and wear due to friction is reduced to a minimum without need for special lubrication.

In view of the impact stress factors involved in the use of the hammer stapler, reinforcement is preferably provided in the upper portion of the side plates 133 and 134, and especially in association with the lever pin 130. For this purpose, metallic reinforcing plates 149 are set flush into the outer faces of the side plates preferably by molding, the reinforcing plates being secured in place as by means of keying lugs 150 of the material of the respective side panels interlocked within respective taper edged interlock apertures 151 in the reinforcing plate. To provide solid bearing support for the lever pivot pin 130, each of the reinforcing plates 149 is provided with an inturned bearing flange 152 defining the respective bearing openings 140 for the pivot pin. Reinforcement for the bearing flanges 152 is provided by a metallic reinforcing disk or washer 153 press fitted about each of the bearing flanges and preferably taper-edged as indicated at 154 (Fig. 6) for interlocking with the plastic material of the side panels of the unit. As a result, the respective areas of the side panels 133 and 134 which are subjected to the greatest stress or shock from impact in the operation of the machine, and especially in the areas thereof about the pivot pin 130 are stiffened and reinforced and the pivot pin 130 is supported on a fixed axis relative to the assembly in spite of the inherent tendency of the plastic material to yield in response to an impact thereagainst. On the other hand, operation of the machine is very quiet due to the cushioning and sound deadening effect of the plastic material of the side panels 133 and 134. It will be observed in Figs. 14 and 15 that the upper edges of the reinforcing plates 149 are coincident with the upper edges of the side panels 133 and 134 as are also the front edges of the reinforcing plates coincident with the front edges of the side panels.

When the driver unit is mounted within the head end section 25 of the hammer stapler, the

lower edges of the side panels 133 and 134 are disposed above the forward portion of the channel 82 of the anvil member 79 while the upper edges of the side panels are received under the forward portion of the top wall 28 of the housing shell. The outer faces of the side panels and the flush reinforcing plates 149 slidably oppose the inner surfaces of the housing side walls 30 and 31 in the upper forward narrow spacing thereof. The construction and arrangement are such that the driver unit can be slid into position from the front end of the hollow housing shell which is for this purpose arranged to be opened at will.

Support of the driver unit is effected by interengagement of the side walls 30 and 31 and the side panels 133 and 134. For this purpose longitudinally extending respective inwardly projecting interlock ribs 155 (Figs. 2 and 4) in the side walls 30 and 31 slidably engage in complementary longitudinally extending interlock grooves in the outer faces of the side panels 133 and 134 (Figs. 4, 14 and 15).

Releasable retention of the driving unit against forward displacement from the head section 25 of the machine is effected at least in part by the striker guide pin 109 which extends through aligned apertures 158 in the lower portions of the side panels 133 and 134 and through a metallic retaining block 159 which is held removably between the side panels by engagement with the forward faces of the spacer bosses 138 and with upper and lower retaining bosses 160 formed on the inner sides of the side panels forwardly from the bosses 138 and at the inner sides of the driver guide channels 148. Further retention of the driver unit is effected by the pivot pin 130 which is driven into place and displaces the temporary pin 130' after the driver unit has been inserted fully into the housing and before the striker 100 is assembled with the head end portion of the housing. The end portions of the pin 130 (Fig. 6) extend in thrust bearing relation through bearing apertures 130*a* in the side wall panels 30 and 31. Snap rings or washers 130*b* on the pin end portions retain the pin against displacement. When the driver unit is to be removed from the machine, the pins 109 and 130 are released and removed.

Front closure and anvil gate

Further retention of the drive unit within the head section 25 of the housing is effected by means of a releasable hinged gate 161 of generally L-shape adapted to close the forward end of the housing shell (Figs. 1, 2, 3 and 4). The gate has an upper short leg 162 which overlies the forward portion of the top wall 28 of the housing and has marginal side flanges 163 fitting down around the upper contiguous margins of the side walls 30 and 31 of the housing and terminating at the distal end of the leg 162 in a pair of parallel journal ears 164 which are appropriately coaxially apertured and accommodate a headed attachment hinge pin 165 extending therethrough and through appropriate aligned apertures in the side walls 30 and 31 of the housing and the side plates 133 and 134 forwardly of the main portions of the spacer bosses 139 at the inside upper rear portions of the side plates 133 and 134. The hinge pin 165 is quickly removably retained in place as by means of a cotter pin 167 extending through its projecting end opposite the head of the pin. Through this arrangement the pin 165 can be readily removed when it is desired to withdraw the driving unit from the head end of the machine.

A downwardly extending angular front leg 168 of the gate member is of a length to close the front of the machine or at least the front of the driver unit and extends throughout the height of the machine from the top down to the lower face of the forward portion of the bottom wall 29 of the housing. When the gate is to be opened it is swung up about the hinge pin 165 into a position as shown in dash outline in Fig. 2. When the gate is closed, the front leg 168 is held against unintentional opening by a pivoted latch 169. The upper portion of the latch has a journal 170 which is hingedly connected as by means of a pin 171 between a pair of forwardly projecting hinge lugs or ears 172. This enables the pivoted latch arm to swing into and out of latching position as indicated in full and dash outline, respectively, in Fig. 2.

In the latching position, the latch 169 operates to retain the gate member 161 in closed relation at the front of the hammer stapler by engagement of a pair of rearwardly projecting spaced parallel latching or interlock lugs 173 on the distal end portion of the latch arm with respective contiguous forwardly projecting respective latching interlock or keeper shoulders 174 and 175 on the side walls of the housing and the side panels of the driver unit at the forward margins of the side walls and panels. The latching flanges or lugs 173 are spaced apart sufficiently to clear the side edges of the front leg of the gate 168 and have upwardly facing preferably concavely arcuate rearwardly and upwardly curving interlock shoulders 177, and the shoulders 174 and 175 are complementary in radius. Through this arrangement, as will be best appreciated from Figs. 2 and 3, an efficient hooked under relationship of the interlock shoulders is attained which will resist any force tending to swing the gate member outwardly and it will be necessary to swing the latch member 169 out of latching position before the gate member can be swung to open position. The interlock shoulders 174 are provided by laterally extending lower edge integral flanges 178 on respective forwardly projecting wing flange portions 179 on the respective forward margins of the side walls 30 and 31 of the housing shell. The interlock shoulders 175 are provided on the lower edges of forwardly extending wing flanges or lugs 180 on the forward margins of the respective side panels 133 and 134 of the driver unit.

Retention of the latch member 169 against unintentional opening is effected by releasable means such as a yoke-like retainer preferably formed from heavy spring wire having a generally U-shape and including a yoke head portion 181 engageable about the lower latching head end portion of the latch member. A pair of substantially elongated spring legs 182 extend rearwardly under the guide pin journal bosses 112 inside the side wings 101 of the striker (Fig. 4) and then extend upwardly rearwardly of the lower portion of the striker and outwardly of the rearwardly projecting slotted upper portion of the striker and are yieldably anchored under tension by engagement in retaining annular grooves 183 in the respective opposite end portions of the actuating pin or shaft 127 outwardly of the striker-engaging rollers 125 thereon. This affords a multi-advantage relationship since not only are the spring retainer legs 182 thus maintained under resilient tension by engagement

under the respective tensioning fulcrums provided by the bosses 112 and thus cause the yoke head to be constantly and positively biased rearwardly into firm latch-retaining relation, but the retainer legs also serve as retainers or keepers for the shaft 127 and the rollers 125. By their engagement in the grooves 183 (Fig. 6) the arms or legs 182 are held against displacement in axial direction from the end portions of the shaft 127 and in turn retain the rollers 125 against axial displacement endwise from the shaft, and by cooperation with the rollers 125 retain the shaft in generally endwise centered relation in the assembly. Nevertheless, when it is desired to disassemble the mechanism, the retainer arms 182 can be readily flexed out of engagement with the shaft 127 and the shaft displaced endwise from the assembly. An additional advantage of having the retainer arms 182 engaging the shaft 127 resides in that as the striker 100 is activated upon a staple driving impact and thus moves the actuating shaft 127 in its upwardly and forwardly arcuate operating movement, the arms 182 are correspondingly flexed forwardly, thus exerting increased retaining tension upon the retainer member at the very moment when the maximum jarring and centrifugal forces are active tending to swing the latch 169 open unintentionally.

It will be observed that the spring arms 182 of the retainer are of relatively great length and that the tensioning curvature thereof is on a large radius while the respective fulcrum points provided by the bosses 112 and the respective tensioning points provided by the shaft 127 are spaced a substantial distance apart so that tensioning deflection on the arms 182 is distributed throughout such a length of each of the arms as to avoid concentration of bending stresses and fatigue failure of the spring arms.

Further implementation of the tensioning of the spring retainer results from having the fulcrums afforded by the bosses 112 offset downwardly relative to respective lateral retaining lugs or ears 184 at the sides of the lower latching head portion of the latch 169 and engaging under the retainer head end portions of the arms 182. Since the bosses 112 are spaced substantially rearwardly from the latch, substantial tension is developed in a downward and rearward direction in the retainer head 181 in the full assembly. It will also be observed in Fig. 4 that the arms 182 of the latch retainer flare or are in divergent relation from the head 181 so that when the latch 169 is to be opened removal of the spring retainer yoke is easily effected by releasing the legs 182 thereof from the shaft 127 and drawing the retainer forwardly until the retainer ears 184 are cleared and the retainer can be dropped clear of the latch head. Reassembly is, of course, easily effected by a reversal of the steps described for removal of the retainer spring. The upper or distal ends of the arms 182 are preferably provided with return bent terminals 185 disposed on the forward sides of the legs for finishing purposes and to avoid upstanding sharp edges (Figs. 1, 2 and 6).

In the operation of the hammer stapler, upon the impact of the striker 100 against the surface of the object to be stapled, the driving member 132 is driven downwardly between the front end portion of the anvil 79 and the lower end portion of the gate member 161 which cooperates with the front end of the anvil to provide a staple guideway or driveway 187 (Figs. 3 and 7) down which a staple is driven after it has been severed by the driving member from the leading end of a strip of staple blanks fed into the upper end of the driveway 187. A staple exit hole 188 is provided by the forward edge of the housing lower wall 29 in cooperation with the lower end of the gate member.

Staple forming, severing and driving

As the driver 132 descends in a driving stroke, a shearing edge 189 at the inner side of the driving tip of the driver cooperates with a shearing edge 190 at the forward undercut or raked end of the anvil 79 (Figs. 3, 7 and 8) to shear the formed staple from the staple blank strip and the staple is then driven on down through the driveway 187. As the staple is sheared from the strip, it tilts downwardly and with the staple legs swinging rearwardly as is desirable in order to facilitate the shearing action. However to prevent over-tilting, respective downwardly and forwardly sloping tapers or lead-in ramps 191 are provided at suitable distance below and at opposite sides of the shearing edge 190 on the front end of the anvil member and extending forwardly beyond the shearing edge 190 for engagement by the tips of the staple legs (Fig. 8) not only to limit the tilting of the staple but also to guide and straighten the staple legs forwardly into the driveway 187 after severance of the staple.

It has been found that there is a tendency for the staple legs to escape sidewise from the ramps 191 and cause the staples to be upended, sometimes with jamming effect as the driving members moves down from the severing position. To eliminate this hazard, means are provided at the outer sides of the ramps 191 providing lateral guide and retainer surfaces for the staple tips. Herein such means comprise integral side walls 192 formed in one piece with the forward end portion of the anvil block at the respective outer sides of the lead-in ramps 191. These walls provide shoulders which positively prevent running out of the staple leg tips at the ends of the ramps and assure that the staple tips will move down into the driveway 187.

To define the driveway 187 and provide a guideway for the driving end portion of the driver 132, the forward end portion of the anvil is formed as a central forwardly projecting nose 193 which cooperates at its forward end or tip with flanking, interengaging, rearwardly projecting staple driveway side wall projections 194 on the lower inner portion of the gate member front leg 168 (Figs. 7, 8 and 10). Snug lateral-stability interengagement of the driveway walls 194 with the nose portion 193 is effected by internesting engagement of complementary side front edges of the nose portion 193 in rounded socket-like vertical recesses or pockets 195 in the respective side wall projections 194. The upper ends of the pockets 195 are defined by rigid downwardly facing thrust shoulders 196 opposing upwardly facing thrust shoulders 196*a* at the opposite sides of the nose portion 193 outwardly relative to the staple tip retaining walls 192. Thereby an internested thrust interlock is provided for transmitting upthrust on the forward end of the anvil to the gate leg 168 and thence through the latch 169 to the housing 21.

The driveway wall surfaces of the wall projections 194 are shaped or tapered inwardly as shown at 197 generally conformable to or cooperative with the lead-in tapers 191 to a drive-

way throat of a width substantially equal to the spacing between the guide shoulders or surfaces **192** for receiving and guiding the staple legs downwardly and providing lower guideway for the driving member **132**. Spaced from the forward tip of the anvil nose **193** and disposed inwardly from the wall projections **194** are respective guide driveway boss portions **198** on the gate member cooperating with the anvil nose to provide generally channel-shaped ways for the staple legs and the sides of the member **132** at the sides of the driveway **187**. It will be observed that clearance is afforded between the inner ends of the lead-in ramps **191** at **191***a* and between the adjacent or inner ends of the guideway bosses **198** at **198***a* for the rear and forward central projections on the staple heads resulting from the severed central connecting web portions by which one staple blank is connected to the others in the strip.

When the staple-driving stroke has progressed substantially, the driver **132** in cooperation with the anvil block forward nose portion **193** forms the next succeeding flat staple blank into the U-shape desired for the staple. To this end, the anvil nose portion **193** is formed above the shoulders **196***a* of a narrower width approximately equal to the inside width of a staple to be formed and has the sides undercut for clearance (Fig. 8) and the driver **132** is provided with a rearwardly and downwardly opening vertical forming channel **199** between the guide ribs **147** thereof and having downwardly directed rounded forming shoulders **200** (Fig. 16). In the downward advance of the driver, the forming shoulders **200** cooperate with tapered longitudinally or forwardly extending spaced, parallel axis forming shoulders **201** on the upper side edges of the anvil nose portion (Figs. 7 and 8). As a result, the next succeeding staple blank is formed as an incident to driving of the previously formed staple on the leading end of the strip.

In order to assure uniform driving of the staples the driving tip of the driver **132** is formed at each side with a concave shoulder **132***a* generally conformable to the opposing convex shoulder of a staple.

Staple hold-down and feed unit

Means are provided operative as an incident to and preferably as a result of motivation by the staple forming, cut-off and driving member **132** for feeding the staple strip by staple unit increments into driving position. Herein such means comprise part of a "package" unit **202** including a staple strip holding or back lash preventing device and a hold-down device.

As best seen in Figures 3, 11, 12 and 13, the staple feed and hold-down unit **202** is so constructed and arranged that it can be inserted into and removed from the head end section **25** of the machine with the driver unit. To this end, the feeder unit comprises a frame preferably formed as a one piece heavy gauge sheet metal stamping of generally inverted U-shape comprising complementary spaced side wall panels **203** and **204** connected at their upper margins by an integral web wall **205**. Pivotally mounted between the side wall panels **203** and **204** on a pivot pin **207** adjacent the top of the unit is a flat lever member **208** with the major extent thereof depending to adjacent the bottom of the bracket or housing and swingable in a front to rear direction. To the lower end of the lever **208** is connected as by means of a pivot pin **209** a forwardly and downwardly extending feed arm or lever **210**. This lever may be of inverted U-shape in cross section with parallel rear end portions slidably disposed at opposite sides of the lower end of the supporting lever **208** and providing journals for the pin **209**. A torsion spring **211** yoked over the feed lever **210** and coiled about the outer ends of the pin **209** has tensioning arms **212** anchored against a transverse anchoring pin **213** carried by the lever **208** above the pivot pin **209** and normally biases the feed lever in a downward direction. At the same time the lever **208** is biased to normally assume a forwardly swung direction by means of a torsion spring **214** yoked about the upper rear portion of the lever and coiled about the pivot pin **207** or side spacer washers carried thereby and with tensioning end arms **215** of the spring anchored against the rear edge of the connecting web portion **205** of the unit housing.

The feeder unit **202** is constructed and arranged to be inserted into the head section **25** of the machine in conjunction with the drive unit and is arranged to be held in predetermined front to rear position by the drive unit side panels **133** and **134**. To this end, the drive unit side panels are appropriately notched or cut out in their rear lower portions to provide respective downwardly opening rectangular sockets **217** complementary to and within which the front and rear margins of the side panels **203** and **204**, respectively, are adapted to be received in assembly. For this purpose each of the feeder housing side panels **203** and **204** is provided with a laterally projecting front marginal engagement wing flange **218** and a rear marginal engagement wing flange **219**, with the total width defined by the pairs of front and rear wing flanges substantially equal to the width between the outside faces of the driving unit side panels. The front to rear spacing between the front and rear faces of the wing flanges is equal to the spacing between the vertical edges defining the sockets **217**. Therefore when the unit **202** is fitted into the sockets **217**, both of the unit assemblies are adapted to be inserted into the head section of the machine together. For interengagement with the side walls **30** and **31** of the housing shell of the machine, similarly as effected by means of the housing shell retaining ribs **155** in the longitudinal grooves **157** of the driver unit side wall panels, each of the flanges **218** and **219** is formed with a recess **220** complementary to the retaining ribs **155** so as to interengage retainingly with said ribs.

For additional stability of the feeder unit in assembly in the machine, and in order to facilitate insertion thereof into the machine, side foot flanges **221** are provided on the bottom margins of the side wall panels **203** and **204** to project laterally and engage slidably upon the side ribs **85** of the anvil member **79**.

In the assembled relationship, as best seen in Fig. 3, an operative actuating relationship is effected between an actuating finger **222** projecting downwardly and rearwardly from the head portion **144** of the staple driver member and a forwardly projecting portion of the lever member **208** of the feeder unit. For this purpose the forwardly projecting portion of the feeder unit lever **208** is formed with a downwardly and forwardly slanting cam edge **223** which in the fully retracted position of the plunger **132** lies below the rear edge of the actuating finger **222**. The construction and relationship is such that when

the driver 132 is driven downwardly in a staple driving, cut-off and forming stroke, the actuating finger 222 acts on the cam surface 223 and swings the feeder motivating lever 208 rearwardly to thereby retract the feeder arm or lever 210 which normally engages behind the formed staple at the leading end of the staple strip. This feeder arm retraction movement is one staple width so that staple-engaging tip prongs 224 on the feeder arm will engage behind the next succeeding staple blank and when the driving member 132 returns to retracted position, and the actuating finger 222 enters a clearance notch 225 in the upper forward portion of the lever 208, the lever 208, under the impulse of the biasing spring 214 snaps forwardly to drive the feeder arm lever 210 forwardly and thus advance the staple strip one staple blank forwardly.

In order to assure a feeding action of the feeder unit even though something may cause the mechanism of the feeder unit to stick, or if the spring 214 should break, a positive feeding return action is provided for by having a return head or finger or lug 227 at the upper forward portion of the lever 208 above the clearance notch 225 and in a position to be engaged by the upper side of the actuating finger 222 in the retracted position of the drive member. In this relationship, the feeding mechanism must operate in a feeding stroke irrespective of any other factors that might otherwise cause delay or tend to block the feeding action.

Inasmuch as the feeding lever 210 must travel rearwardly with frictional engagement of the feeding prongs 224 with the next succeeding staple blank, a holding arm or lever 228 is provided which is pivotally connected as by means of a pivot pin 229 between the lower forward portions of the side panels 203 and 204 of the feeder housing and projects forwardly under the feeder finger or lever 210 so that holding prongs 230 on the holding lever will engage behind the rear edge of a succeeding staple blank and hold the strip against return movement. The hold-down lever 228 is normally biased to swing downwardly by means such as a torsion spring 231 wound about the pivot pin 229 and having an arm in engagement with the hold-down lever forwardly of its pivot and a torsion arm engaging an anchoring pin 232 spaced rearwardly from the hold-down lever pivot between the side wall panels 203 and 204 under the feeding lever 210 during a feeding forward movement of the staple strip, the hold-down lever 228 yields upwardly and then snaps down behind the next succeeding staple blank.

By having the feeder cam lever 208 spring-biased forwardly forward thrust pressure is imparted to the driving member 132 through the finger 222 and this avoids striking of the driver shear edge 189 on the anxil shear edge 190, should there be any play between the plunger or its aligned guideways.

In order to facilitate initial feeding of a staple strip under the feeding unit and then to flatten out the strip as it is fed forwardly by the feeding unit, a flat spring hold-down lever 233 is provided which projects forwardly between the lower margins of the side wall panels 203 and 204 and under the remainder of the feeder unit mechanism including the hold-down lever 228 and the feeder lever 210 and with the forward end portion thereof projecting forwardly between the prongs 224 and 230 to lie upon and press downwardly against the staple blank 20 in position to be formed.

As best seen in Fig. 3, the rear end portion of the hold-down spring 233 in assembly overlies the deepest portion of the staple strip track 82 in the anvil block and provides a substantial gap between the bottom of the track and the undersurface of the hold-down spring so that the leading end of the staple strip can readily be fed forwardly in the track. At the forward end of the track the hold-down spring lever 233 normally tends to engage the bottom surface of the track and thus holds the forward end portion of the staple strip firmly down in the track. Then as the strip runs out to a trailing end dummy blank like the dummy D (Fig. 9), the lever 233 assures that the final staple blank 20 will be formed and driven.

Mounting of the hold-down spring 233 is effected at the rear of the feeder unit 202 by means such as a rivet 234 which fixedly secures the rear end portion of the strip to a rearwardly projecting horizontal eye or lug 235 formed as an integral angular flange on a vertical spacer and supporting plate 237 having side edge lugs 238 secured in respective slots 239 in the rear lower portions of the side wall panels 203 and 204. Since the rear portion of the hold-down spring 233 is substantially narrower than the spacing between the side wall panels 203 and 204, the lower margin of the supporting plate 237 is provided with downwardly extending centering lugs 240 which flank the rear end portion of the hold-down spring and hold the same against turning about the axis of the rivet 234.

Further interconnection between the feeder unit 202 and the driving unit is effected and a spring bias for normally returning the driving mechanism to the initial or inactive condition thereof is effected by means of a coiled tension spring 241 having one end attached to an anchor pin 242 extending between rearwardly projecting bifurcations 243 on the actuating lever 129 of the driving unit. The opposite or lower end of the connecting and return spring 241 is attached to a transverse anchoring pin 244 carried by and between rearwardly projecting vertical parallel ears 245 at the lower portions of the side wall panels 203 and 204 of the feeder unit housing. The ears 245 are provided with appropriate coaxial apertures 247 for reception and support of the pin 244. The spring 241 is tensioned normally to rock the actuating lever 129 clockwise as seen in Fig. 3 and stretches to accommodate counterclockwise movement of the actuating lever 129 in response to actuation by the striker 100 when a staple driving blow is struck.

Summary of operation

After the combined driving unit and feeder unit have been inserted in the head section 25 of the machine and the gate 161 swung down into closing and retaining relation to the assembly, and the latch 169 has been locked in place, with the striker 100 also operatively mounted on the machine, the latch retainer spring 181, 182 also being operatively positioned, the machine is ready for operation. A roll R of staple blanks is placed into the magazine of the hammer stapler and the leading end portion of the roll fed from the magazine under the guide roller 83 into the anvil track 82 and with a prongless starter dummy terminal blank D in the staple driving position. This is accomplished quickly and easily by reason of the anti-friction non-snagging structures that have been described. The door 54 is then closed and the machine is ready for operation.

On the initial stroke the dummy blank D comes out flat but every succeeding blank inclusive of the last blank in the strip will be formed to the U-shape and driven accurately from the machine in response to actuation of the striker 100 on impact against a surface into which a staple is to be driven.

In manipulating the machine it is wielded the same as a hammer. That is, the handle 22 is grasped and the machine is swung at and in hammering relation against the object to be stapled, with the striker 100 aimed to strike the object.

In order to lessen the area of the forward portion of the lower wall 29 of the machine which will strike the object, only a relatively short forward portion of the bottom wall 29 is disposed in a plane to provide a flat impact surface while the remainder of the bottom wall of the housing is angled upwardly and rearwardly to remain substantially out of contact with the object to be stapled, or at least that particular portion of the surface of the object which is to receive the staple. By preference, the angle of such remainder of the bottom wall 29 relative to the forward impact portion thereof is great enough to afford ample clearance under the magazine section 27 and at least at the rear lower portion of the magazine section to accommodate the fingers of the user of the machine when the machine is grasped at the extreme forward portion of the handle section 22 or at the rear portion of the magazine section as may occur when the hammer stapler is used with a short hammering stroke. This relationship is best seen in Figs. 2 and 3. It will also be observed from Figs. 1 and 2 that the shape of the juncture portion of the housing shell 21 between the handle 22 and the magazine section 27 is such as to readily accommodate convenient and comfortable grasping of the machine in that area when desired.

Should a staple become jammed in the driveway 187 for any reason, it can be very readily cleared by the simple expedient of swinging the gate 161 open. This can be effected without the use of any tools but simply by releasing the retainer spring from the latch 169, swinging the latch open and then swinging the gate open.

If anything goes wrong in either the driving unit or in the feeder unit, these can be readily removed and repaired or replaced by the simple expedient of opening the gate 161, removing the pins 109, 127 and 165, and withdrawing the driver and feeder units. This is a substantial convenience to the user because by having on hand standby driver and feeder units, the hammer stapler can be kept in continuous service while the driver or feeder unit that has broken down for any reason is being repaired, even if it requires factory service for the repair. However, by virtue of the rugged, efficient structural relationships of the mechanism of the present hammer stapler, long, trouble-free useful service can be expected from the machine.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. In combination in a hammer stapler, an elongated body comprising a rear handle section and a front head section with an intermediate magazine section intervening between the handle and front head sections and all of the sections being in line, said magazine section being disposed close to the head section and including means for reception of a substantial roll of metal staple blanks in a continuous strip, said magazine section including a passageway forwardly from the bottom portion thereof into said head section, and means disposed within the head section for severing and driving staples from the leading end of the staple blank strip responsive to wielding of the hammer stapler hammer-like for driving the staples.

2. In combination in a hammer stapler, an elongated body comprising a rear handle section and a front head section with an intermediate magazine section intervening between the handle and front head sections, said magazine section including means for reception of a substantial roll of sheet metal staple blanks in a continuous strip and including a passageway forwardly from the bottom portion thereof into said head section, and means for severing and driving staples from the leading end of the staple blank strip responsive to wielding of the hammer stapler hammer-like for driving the staples; said magazine section means including anti-friction structure engageable by the outside of the staple strip roll to minimize frictional or abrasion resistance of the staple blank strip in the roll to forward movement of the staple strip in the operation of the hammer stapler.

3. In combination in a hammer stapler, an assembly including an elongated handle and a driving head section with an intervening magazine section all disposed in longitudinal series, said magazine section being generally flattened and of maximum dimension in a vertical sense, said magazine section having means therein for supporting a substantial roll of metal staple blanks and including a passage to the driving head section, and means carried by the driving head section for successively driving staples from the leading end of the staple blank strip substantially square into a surface responsive to wielding of the hammer stapler hammer-like against such surface for stapling, said magazine section being of substantially greater vertical dimension than the handle and including a juncture area with the handle shaped to accommodate grasping the same for short leverage wielding of the hammer stapler, the bottom of said magazine section and said juncture area being disposed in substantial clearance elevation relative to the lower forward portion of the driving head section so as to accommodate the fingers of the user's hand to avoid striking the same against an object being stapled during said short leverage wielding of the hammer stapler.

4. In combination in a hammer stapler, an elongated tubular sheet metal shell body including spaced side walls and spaced top and bottom walls, said body including an elongated rear handle section and a relatively short front end head section with an intervening vertically enlarged magazine section closely adjacent to said head section, said magazine section having means therein for supporting a substantial roll of sheet metal staple blanks in strip form to be fed forwardly from the magazine section into the head section, and means carried by the head section for driving staples from the end of the strip in response to wielding of the hammer stapler hammer-like, said handle section having the bottom wall portion thereof spaced substantially above the lower wall portion of the magazine section to afford finger clearance to facilitate wielding of the hammer stapler.

5. In combination in a hammer stapler, an elongated tubular sheet metal shell body including spaced side walls and spaced top and bottom walls, said body including an elongated rear handle section and a relatively short front end head section with an intervening vertically enlarged magazine section, said magazine section having means therein for supporting a substantial roll of sheet metal staple blanks in strip form to be fed forwardly from the magazine section into the head section, means carried by the head section for driving staples from the end of the strip in response to wielding of the hammer stapler hammer-like, and means carried by the head section and magazine section portions of the bottom wall to reinforce the same against impact deformation in the use of the hammer stapler.

6. In combination in a hammer stapler, an elongated tubular sheet metal shell body including spaced side walls and spaced top and bottom walls, said body including an elongated rear handle section and a relatively short front end head section with an intervening vertically enlarged magazine section close to the head section and substantially closed off from the interior of the handle section, said magazine section having means therein for supporting a substantial roll of sheet metal staple blanks in strip form to be fed forwardly from the magazine section into the head section, means carried by the head section for driving staples from the end of the strip in response to wielding of the hammer stapler hammer-like, and means carried by the head section and magazine section portions of the bottom wall to reinforce the same against impact deformation in the use of the hammer stapler, said reinforcing means comprising an elongated anvil block extending from the magazine section throughout substantially the length of the head section and providing a guideway for the staple blank strip.

7. In a stapling machine including staple forming and driving means, a magazine for a roll of partially formed spaced sheet metal staple blanks comprising substantially coplanar oppositely directed pairs of arms connected by medial narrow spacer and connecting necks in strip form to be fed from the magazine to the forming and driving means by staple blank incremental withdrawal of the strip from the roll, means in the magazine for supporting the roll, and means substantially encircling the roll but having an opening therefrom for passage of the strip from the roll to the forming and driving means, said encircling means comprising an inwardly projecting roll-expansion-limiting and friction-reducing arcuate rib medially opposing the periphery of the roll continuously except for said opening to engage the medial neck connecting portion of the strip at the outer periphery of the roll, said rib having a substantially line-contact engagement ridge opposing the connecting neck medial portion of the strip at the periphery of the roll spaced radially inwardly from the sides of the connecting necks.

8. In combination in a stapling machine, means providing a magazine for a roll of sheet metal staple blanks in strip form, said magazine comprising a wall substantially encircling the roll and having an opening therefrom for passage of the strip from the periphery of the roll in the use of the strip for stapling purposes, said wall having a rib projecting from the roll opposing surface of said wall and extending in the direction of rotation of the roll for holding the strip at the roll periphery out of contact with the wall except for engagement with said rib, and a pair of spaced opposing rotary anti-friction plates opposing the opposite sides of the roll and rotatable therewith as the roll rotates in withdrawal of the strip therefrom for stapling purposes.

9. In combination in a stapling machine including staple driving means, a housing providing a magazine for a substantial roll of sheet metal staple blanks having substantially coplanar oppositely extending pointed legs and connected together in strip form, a roll supporting hub structure, said housing having at one side a wall supporting said hub structure and with the hub structure projecting toward the opposite side of the housing, said opposite side of the housing having an opening for insertion of a roll of staple blanks as aforesaid into the magazine onto said hub structure, a rotary anti-friction plate rotatable about said hub structure adjacent to said wall to prevent engagement of the pointed legs at the opposing side of the roll with said wall, a closure for said opening removably mounted on said housing and cooperating with said hub structure to retain the roll rotatably thereon, said closure member having rotatably mounted thereon and removable and replaceable therewith relative to said hub structure a rotary anti-friction plate complementary to said first mentioned rotary plate and opposing the remaining side of the roll in the magazine to prevent engagement of the points of the legs on said remaining side against said closure.

10. In combination in a stapler, a body having a driving portion and an adjacent magazine portion, said magazine portion including means for supporting a roll of sheet metal staple blanks in strip form and having a passage therefrom toward said driving portion for the strip of staple blanks from the roll, means leading from said passage and providing a channel for receiving the strip therein, means within said driving portion for feeding the strip forwardly in said channel for driving staples from the leading end thereof, and a roller located within the body adjacent to said passage and above the portion of the channel adjacent to and leading from said passage to hold the strip down against any tendency of the strip to curl up within said channel.

11. In combination in a stapler, a body having a driving head portion and an adjacent magazine portion, said magazine portion including means for supporting a roll of sheet metal staple blanks in strip form and having a passage therefrom toward said driving head portion for the strip of staple blanks from the roll, means within said driving head portion for feeding the strip forwardly for driving staples from the leading end thereof, a roller located within the body adjacent to said passage and above the path of movement of the strip through the passage to hold the strip down against any tendency of the strip to curl up within said driving portion, and a flat hold-down spring extending forwardly in front of said roller for additionally holding the strip down against any tendency to curl up.

12. In combination in a stapling machine, means for supporting a roll of sheet metal staple blanks in strip form, means providing a track for the staple strip as withdrawn from the roll, a flat hold-down spring supported cantilever fashion at the rear and above said track and

bearing down within said track for straightening the strip, a yieldable holding finger for preventing retraction of the strip, and a feeding lever for step-by-step advancing of the strip.

13. In combination in a stapler, a body having a driving head and means for supplying staples to said head, means within said head for driving staples therefrom, a striker member, means for supporting and guiding said striker member in an undeviating rectilinear reciprocal path on the front portion of said head to move from a striking position projecting below the bottom of said head to a higher elevation in response to stapling impact against a surface to receive a staple, and means operatively connecting said striker with said staple driving means so that on impact stroke movement of the striker said driving means is actuated to drive a staple.

14. In combination in a stapling machine, a body including a housing having an opening therefrom, a self-contained driving unit, a self-contained staple-feeding unit, means separably connecting said units for operation of the feeding unit by the driving unit, said units being removably insertable in said housing through said opening, and means for removably connecting said units in place in said housing.

15. In combination in a stapling machine, a self-contained staple feeding unit including a supporting structure and staple-feeding structure mounted on said supporting structure for movement about an axis transverse to the direction of staple feed action of the feed structure, a housing shell having an opening therefrom, said unit being insertable in said housing shell through said opening, and means for supporting the unit removably in said housing.

16. In combination in a stapling machine, a self-contained driver unit, a self-contained feeder unit, a body comprising a housing having an opening therefrom, said units being cooperably separably related and insertable together through said opening, and rib and groove interconnecting means between said units and said housing for supporting said units in the housing.

17. In combination in a stapler, a body including a head portion and an adjacent magazine section, means for supporting a supply of staple blanks in said magazine section, said head portion having a forward opening, an anvil structure supported within the lower part of said head portion, a staple-feeding unit comprising a housing and staple-feeding means and a staple-feeding-means actuating lever carried by said housing as a self-contained unit, a staple driving unit including a staple driver and a driver-actuating lever and supporting panel members carrying the driver and driver-actuating lever as a self-contained unit, said units being interengageable and insertable in and removable from the head portion through said opening in a position above said anvil, means on said driver for actuating said staple-feeding-means actuating lever, a tension spring connecting said driver-actuating lever with the housing of the feeding unit and serving to maintain the units in predetermined assembled relation as well as biasing the driver-actuating lever to maintain the driver normally in retracted position, said driver and said anvil and said staple-feeding means being cooperably related in assembly for staple-feeding and driving purposes, means carried externally of said head portion and movable relative to said head portion and responsive to substantial impact against a surface to receive a staple, and means operably

connecting said impact-responsive means and said driver-actuating lever for motivating said driver-actuating lever in opposition to said biasing spring to actuate said driver for driving a staple when said impact-responsive means moves responsive to said substantial impact.

18. In combination in a stapler, a body including a head portion and an adjacent magazine section, means for supporting a supply of staple blanks in said magazine section, said head portion having a forward opening, an anvil structure supported within the lower part of said head portion, a staple-feeding unit comprising a housing and staple-feeding means and a staple-feeding-means actuating lever carried by said housing as a self-contained unit, a staple driving unit including a staple driver and a driver-actuating lever and supporting panel members carrying the driver and driver-actuating lever as a self-contained unit, said units being interengageable and insertable in and removable from the head portion through said opening in a position above said anvil, means on said driver for actuating said staple-feeding-means actuating lever, a tension spring connecting said driver-actuating lever with the housing of the feeding unit and serving to maintain the units in predetermined assembled relation as well as biasing the driver-actuating lever to maintain the driver normally in retracted position, said driver and said anvil and said staple-feeding means being cooperably related in assembly for staple-feeding and driving purposes, means carried externally of said head portion and movable relative to said head portion and responsive to substantial impact against a surface to receive a staple, means operably connecting said impact-responsive means and said driver-actuating lever for motivating said driver-actuating lever in opposition to said biasing spring to actuate said driver for driving a staple when said impact responsive means moves responsive to said substantial impact, and a gate member hingedly mounted on the upper part of said head portion and having a part movable across said opening and into cooperative relation to said anvil and said driver to define a staple driveway in which the driver is operable.

19. In a self-contained feeder unit for a stapling machine, a housing comprising spaced wall panels, an actuating lever pivotally mounted between said panels, a staple feed lever pivotally carried by said lever and projecting from the housing, a hold-down lever pivotally carried between the lower portion of the walls of the housing under said feed lever, and a flat cantilever hold-down finger-like spring supported by the lower rear portion of the housing and extending under said hold-down lever and said feed lever, the unit being insertable into a stapling machine.

20. In combination in a stapling machine, a housing, an elongated anvil member supported in said housing and providing a staple track, said anvil member having longitudinal supporting rib means at opposite sides of the track, and means for feeding a staple strip forwardly in said track including a self-contained unit having staple-feeding means and a housing supporting the staple-feeding means and slidably mounted upon the anvil member by engagement with said ribs.

21. In combination in a stapler, a body including a head portion, said head portion being hollow and opening forwardly, staple-driving and

feeding means removably inserted through said opening in a front to rear direction, means in the lower portion of said head portion under said staple-feeding and driving means and cooperable therewith for supporting a staple strip in position to be fed to said driving means for driving thereby in the operation of the stapler, a gate member for closing the opening in the head portion and pivotally mounted on the upper part of said head portion and including a portion swingable into and out of cooperative relation to said staple strip supporting means to define with the latter a driveway for staples driven by said driving means, and a latch carried by said gate member and cooperable with said head portion of the housing for retaining the gate member in its closing position wherein said portion of the gate member cooperates with said staple strip supporting means.

22. In combination in a hammer stapler of the character described, a body including a handle portion and a head portion, said head portion being hollow and open forwardly, a self-contained driving unit within said head portion and having side panels, a gate member swingable into and out of blocking relation to said opening, and a latch carried by said gate member, said latch having on its lower portion upwardly directed interengagement and thrust lugs and said panels and said head portion having cooperating downwardly directed thrust shoulders thereon interengaging with said latch lugs for retaining the latch in gate-latching position.

23. In combination in a stapler, a body having a head portion, said head portion being open forwardly and having a hollow interior, staple-driving and feeding mechanism mounted within said head portion and accessible through said opening, a gate member swingably mounted on said head portion and swingable into and out of blocking relation to said opening, and means for holding said gate member in said blocking relation including a yoke member having legs retained in position at the sides of said head portion and a yoke portion extending in retaining relation about the forward portion of said gate member.

24. In combination in a stapler, a body having a head portion, said head portion having a forwardly opening entrance thereinto, staple-feeding and driving means within said head portion and accessible through said entrance, a gate member swingably mounted on the upper portion of said head portion, a striker movably mounted on the exterior of said head portion, means operably connecting the striker with said staple driving and feeding means and including a shaft movable arcuately upwardly and forwardly in the operative movement of the striker, and a spring retainer yoke member retainingly cooperating with said gate member and having resilient legs connected with said shaft so that on the movement of said shaft upwardly and forwardly said legs are stressed to increase the gate-retaining action of said yoke member.

25. In combination in a stapling machine, an anvil structure for receiving a strip of metal staple blanks for successive driving of staples from the end of the anvil, said anvil end having a shearing edge, a driving plunger having a shearing edge cooperative with said anvil shearing edge and a staple-engaging and driving tip, said anvil structure having lead-in cam surfaces spaced below said anvil shearing edge for engagement by the tips of the staple during shearing tilting thereof to lead the staple tips into alignment under the plunger, and means on and rigid with the anvil structure and projecting forwardly at the outer sides of the lead-in cam surfaces providing lateral guide surfaces for the staple tips to prevent endwise running off of the staple tips from said lead-in cam surfaces, said run-off preventing projection means and said cam surfaces being free from joints at their juncture.

26. In a metal staple driving machine wherein a strip of staple banks is fed to a driving station for successive cut-off and driving of staples from the leading end thereof, an anvil member formed as a one piece block including a shearing edge cooperable with a complementary shearing edge on a driving plunger, lead-in taper surfaces spaced below said shearing edge to guide the staple tips back into alignment with the plunger after shearing, and forwardly projecting wall portions formed in one piece with the anvil member at the respective outer sides of said lead-in taper surfaces to prevent spreading of the staple legs beyond said outer ends of the taper surfaces.

27. In combination in a stapler, a body having a driving head and means for supplying staples to said head, a reciprocable driver in the forward part of said head, a lever pivoted intermediate its ends in the upper part of said head and extending rearwardly above the driver, a link connecting the forward end of the lever with the upper portion of the driver, a striker member, means for supporting and guiding said striker member in an undeviating rectilinear reciprocal path on the front portion of said head to move from a striking position projecting below the bottom of said head to a higher elevation in response to stapling impact against a surface to receive a staple, means operatively connecting the upper portion of said striker to said lever rearwardly from the lever pivot and operable in response to stapling impact movement of said striker to pivot the lever for moving said driver in a staple-driving stroke, and a tension-type return spring attached to the rear end portion of said lever and to a stationary anchorage and normally acting to return the lever and the striker and thereby the driver to an inactive relation after the impact pressure is relieved from said striker.

28. In combination in a staple driving machine, means providing a housing, said housing having an opening thereinto, an anvil structure in the lower portion of the housing adjacent to said opening, a driver unit including a reciprocable driver and means accessible through said opening providing a guideway for the driver above the forward end of the anvil to direct the driver into staple-driving relation forwardly of the anvil, and a removable closure for said opening including means projecting from the inner face plane thereof and cooperating with said anvil to provide a staple driveway and a supplementary driver guideway operatively aligned with the guideway above the anvil.

29. In combination in a stapling machine, a housing having an opening thereinto from the front, an anvil structure in the lower portion of the housing adjacent to said opening, a driver for successively driving staples from the forward end of the anvil, and an openable gate for said opening having means projecting inwardly from the inner face thereof and interposed in thrust interlock cooperation with said anvil structure and defining with said anvil structure a driver and staple guideway.

30. In combination in a stapling machine for forming, severing and driving staples from a continuous strip of partially formed flat staple blanks, means defining a staple-forming, severing and driving station, and means for supplying a strip of staple blanks in flattened condition to said driving station including a guideway tapering toward said driving station with the end of the guideway nearest the driving station fairly closely confining the leading end of the strip to a predetermined longitudinally centered relation.

31. In combination in a stapling machine, a sheet metal housing, an anvil block secured in said housing, a magazine chamber member for supporting a roll of sheet metal staple blanks in a continuous strip in said housing in enclosed relation and the member having an arcuate substantially encircling wall for opposing the periphery of the staple blank roll, and a ramp flange extending from said magazine member wall and secured to the rear end of said anvil block.

32. In combination in a hammer stapler, means providing a handle and a forward driving head portion, said driving head portion being formed from sheet metal and including a bottom wall, a staple blank magazine rearwardly of said head portion, staple-driving means in said head portion, and an anvil block in the lower part of said head portion and carried by said bottom wall and over which the staple blanks are fed to the staple-driving means, said block having downwardly opening weight-reducing cavity therein, said cavity being filled with a light weight shock-resistant cushioning plastic material serving as a buffer for the cavity-opposing portions of the bottom wall.

33. In combination in a stapling machine, supporting structure, an anvil block having a nose portion projecting from one end thereof and defining a staple forming and driveway guide means, and a removable closure member on the supporting structure and having spaced apart inwardly projecting portions thereon complementary to and interengaging in thrust relation with respective opposite side areas of said nose portion and providing front and side walls cooperative with the nose portion to define a complete driveway passage for a staple.

34. In combination in a stapling machine of the character described, a staple strip guideway, means at one end of said guideway for driving a staple downwardly, a supporting structure above said guideway rearwardly from said driving means, a pivoted lever supported at its upper end portion in depending swinging relation by said supporting structure, a feed lever pivotally connected to the lower end portion of said swinging lever and projecting forwardly and cooperating at its forward end with the guideway for feeding a staple strip to said driving means, means for swinging said depending lever for actuating said feed lever including a forwardly projecting abutment on the upper end portion of said depending lever and a member engageable with said abutment for swinging the depending lever forwardly, a torsion spring carried by said depending lever below its upper end pivot and having angularly related torsion arm portions, said spring being anchored on the lever at juncture of said arms, and a pin structure on said lever below but adjacent to said upper end pivot and engaged under torsion loading by one of said arm portions, the other of said arm portions engaging and torsionally acting upon said feed lever to urge the feed lever constantly downwardly about its pivot with the depending lever.

35. In combination in a stapling machine including means for forming and driving a staple from a flat sheet metal strip of staple blanks, means providing a track for the staple blank strip leading to said forming and driving means, means for advancing the strip step-by-step along said track toward said forming and driving means, an elongated hold-down spring member, and means supporting said spring member longitudinally over said track and with the lower face of the spring member opposing the track, the rear end portion of said spring member being angled upwardly relative to said track and cooperating therewith to provide a forwardly tapering throat into which the strip is fed, the forward end portion of said spring member being angled toward the track and having a forwardly extending extremity comprising a substantially flat portion of substantial front to rear extent bearing flatwise into said track in such operative relation to the staple forming and driving means as to engage the foremost staple blank supported on said track means and hold said staple blank flat against the track in the operation of the staple forming and driving means.

36. In combination in a stapling machine, a sheet metal housing having side walls, an anvil block mounted between said side walls, transverse pin means securing said anvil block to said side walls, and means for distributing thrust stresses of said pin means to said side walls comprising washer means in shear stress relation on said pin means and opposing shoulders on said side walls engaged edgewise by said washer structures.

37. In combination in a stapling machine, a housing shell providing a large magazine chamber opening forwardly, staple strip supporting means and staple driving means carried by and in substantially closing relation to the forward portion of the housing shell, a substantially cup-shaped staple strip roll supporting member mounted within said magazine chamber on an axis transverse to said shell and with a circular wall interposed between the interior of the roll container and said driving means, said circular wall having an opening therein defined by a lip flange providing a deflector extending generally toward said staple strip supporting means, and means cooperating with the opposite side of said opening through said circular wall defining a ramp spaced from said deflector lip flange and cooperative therewith to define a gap through which the staple strip from the container is directed to said strip-supporting means.

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