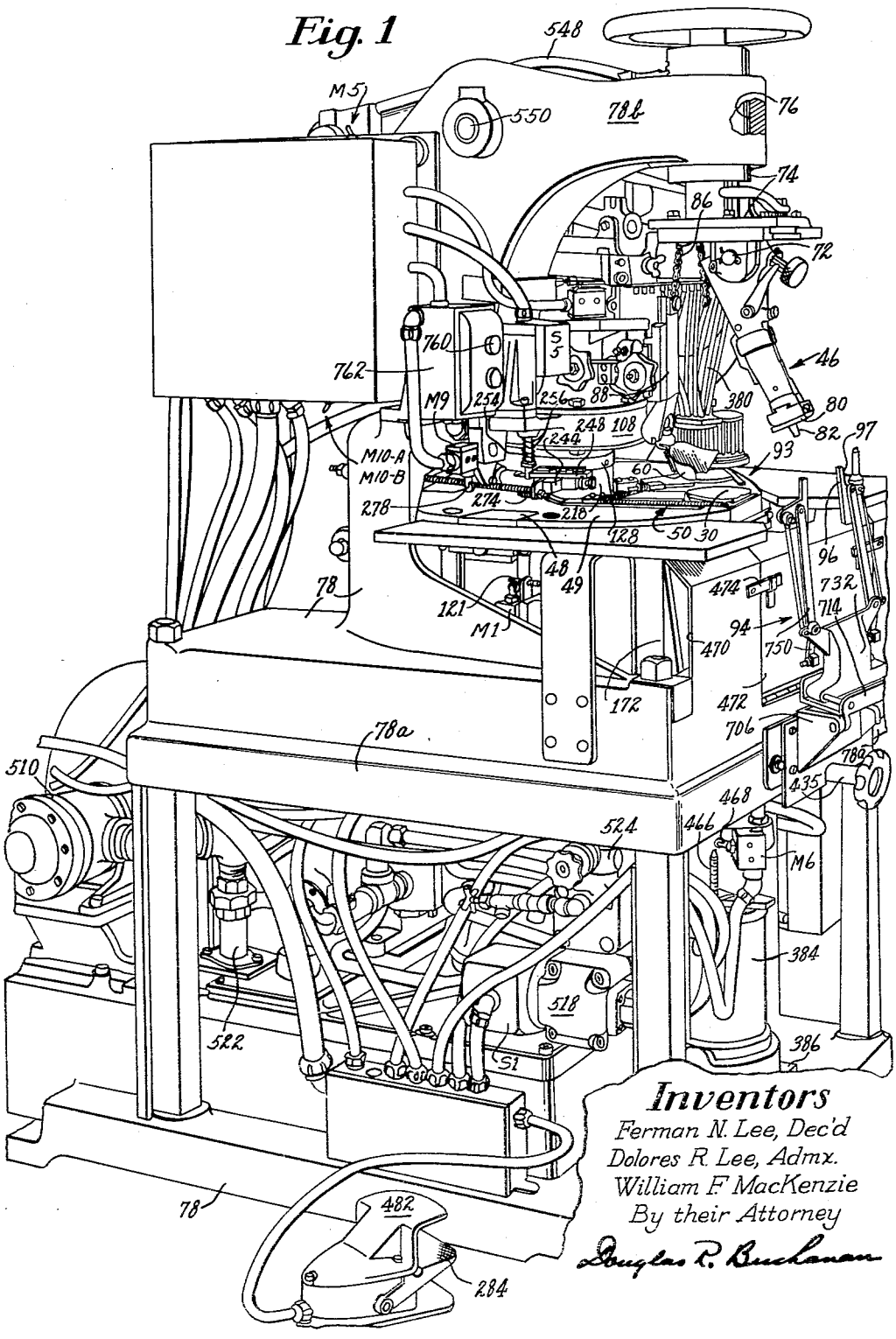
Aug. 8, 1961 W. F. MacKENZIE ET AL 2,994,882

HEEL ATTACHING MACHINES

Filed Jan. 7, 1959 16 Sheets-Sheet 1

Fig. 1



Inventors

Ferman N. Lee, Dec'd

Dolores R. Lee, Admx.

William F. MacKenzie

By their Attorney

Douglas P. Buchanan

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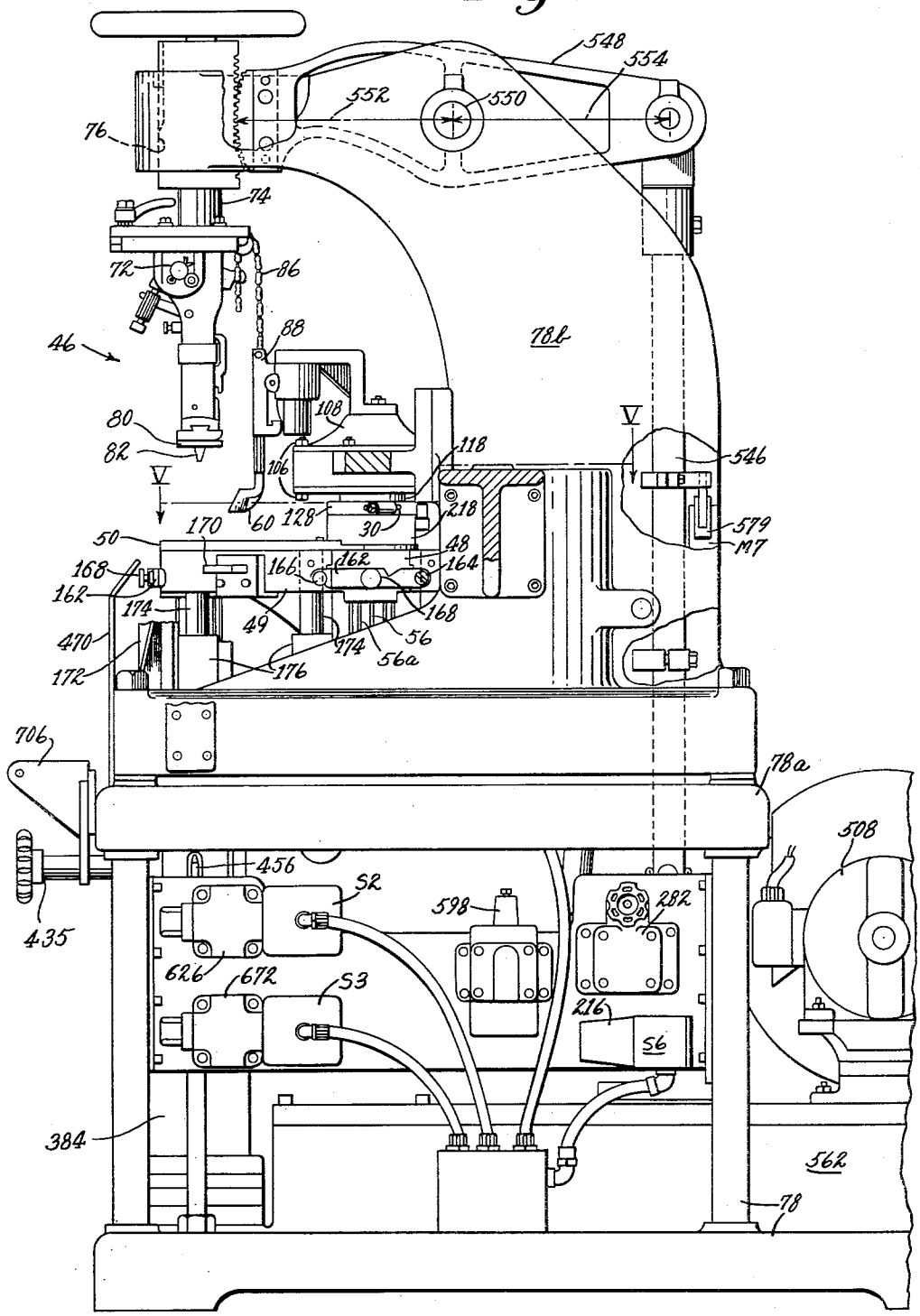
Fig. 2



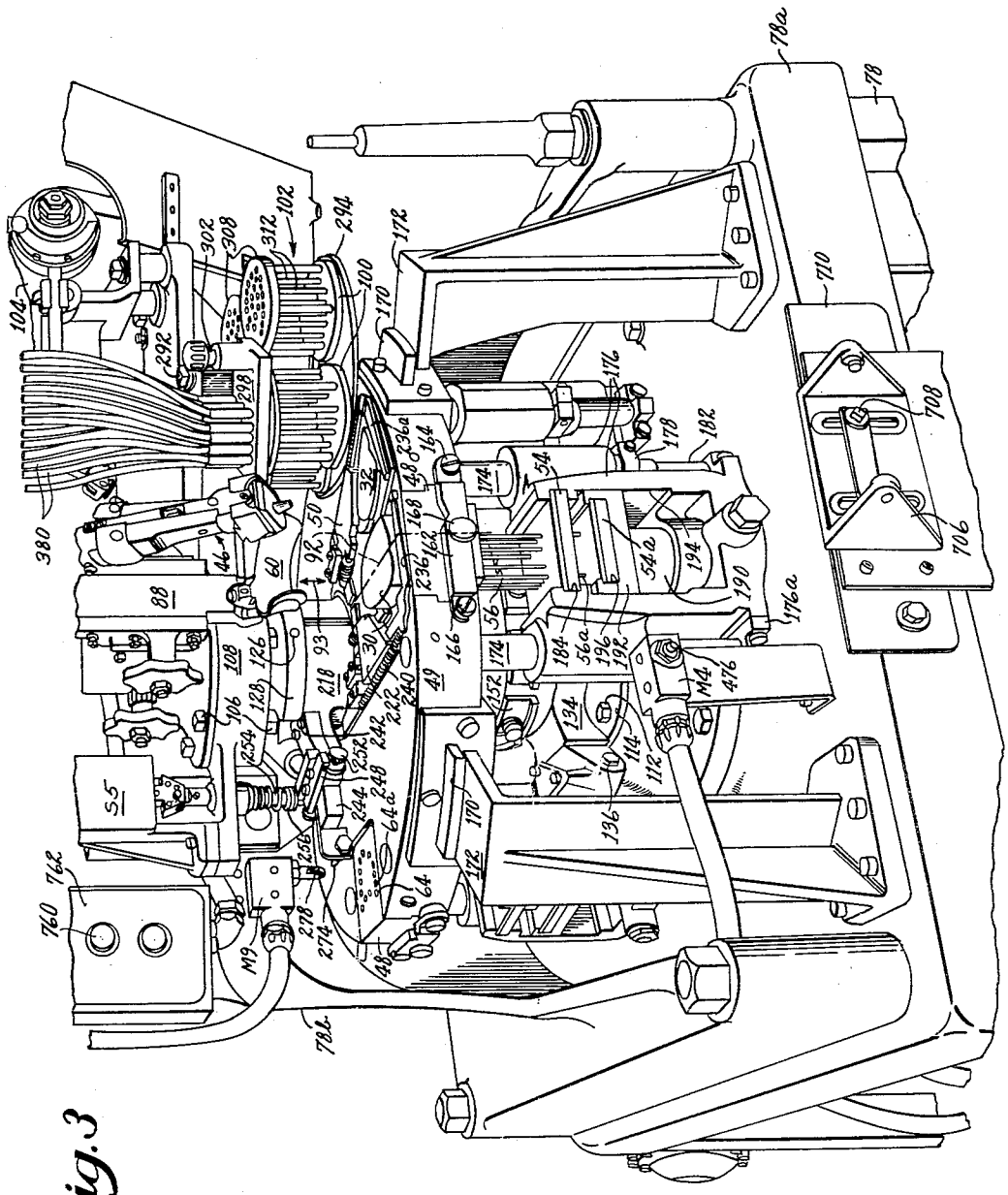
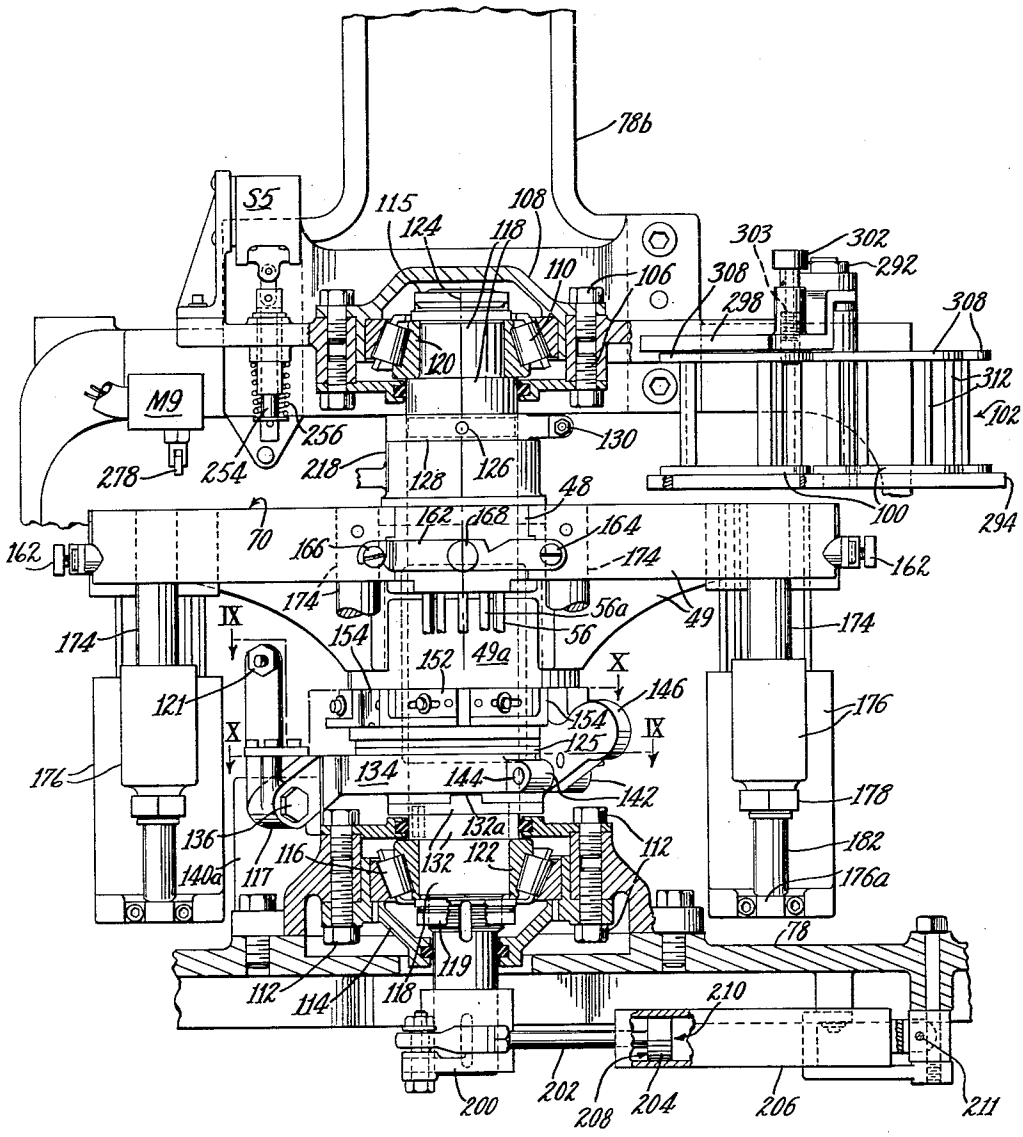


Fig. 3

Fig. 4


78b
S5
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124
108
118
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303
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292
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M9
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278
254
218
128
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100
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162
168
164
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56a
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49a
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132a
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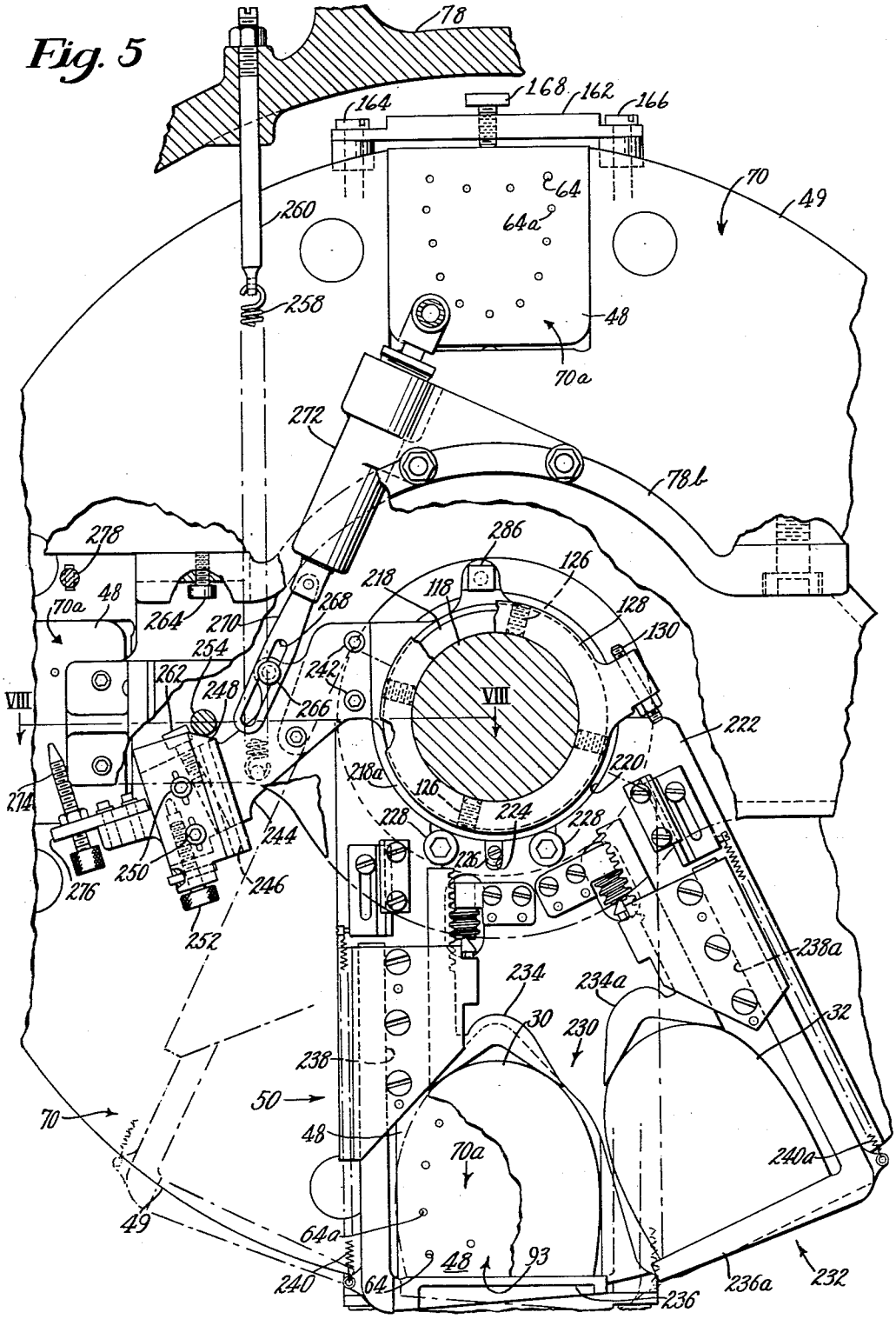
Fig. 5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128
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266
VIII
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220
218a
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250
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276
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238a
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70a
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93
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Fig. 6

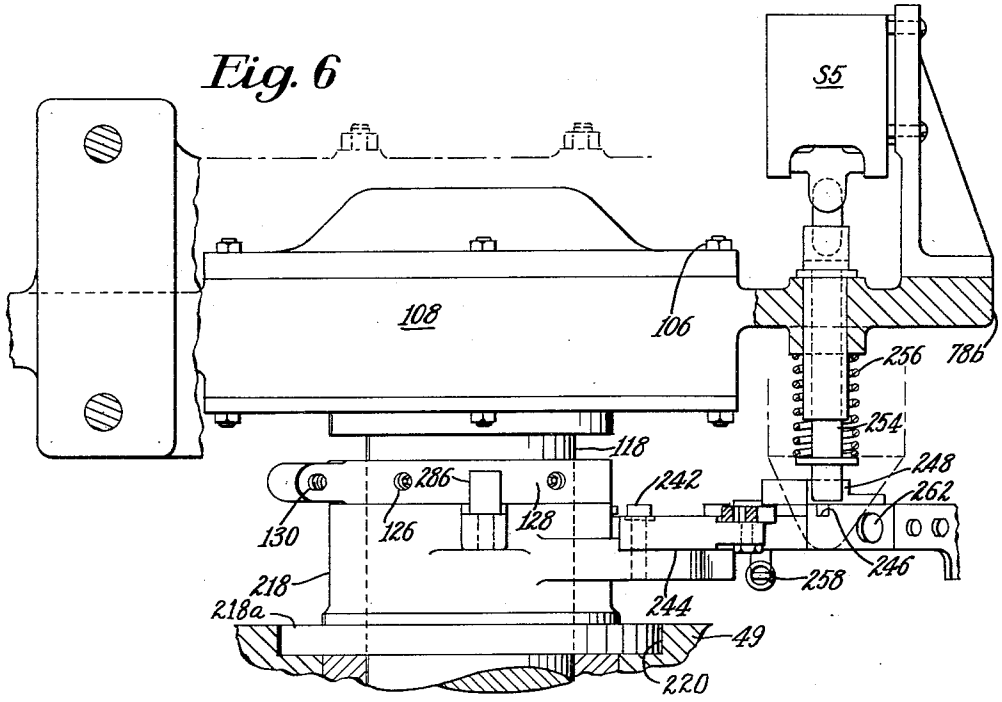

Fig. 7

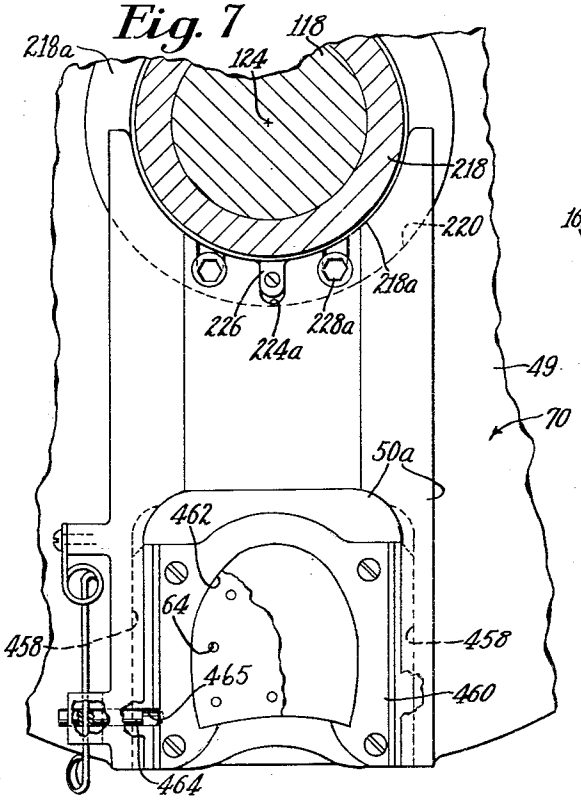

Fig. 8

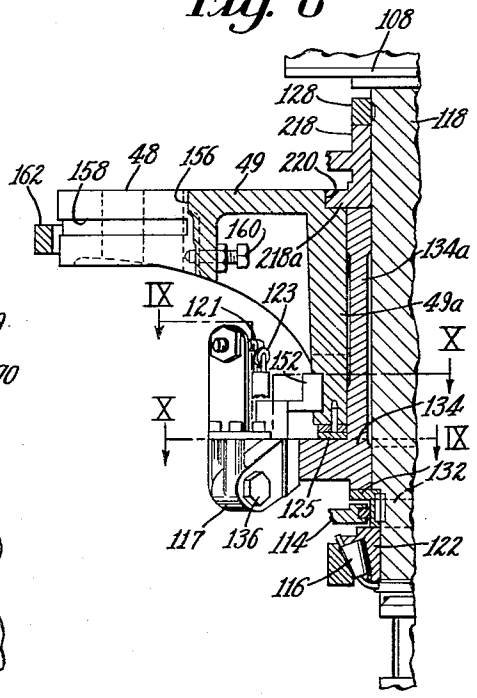

Fig. 9

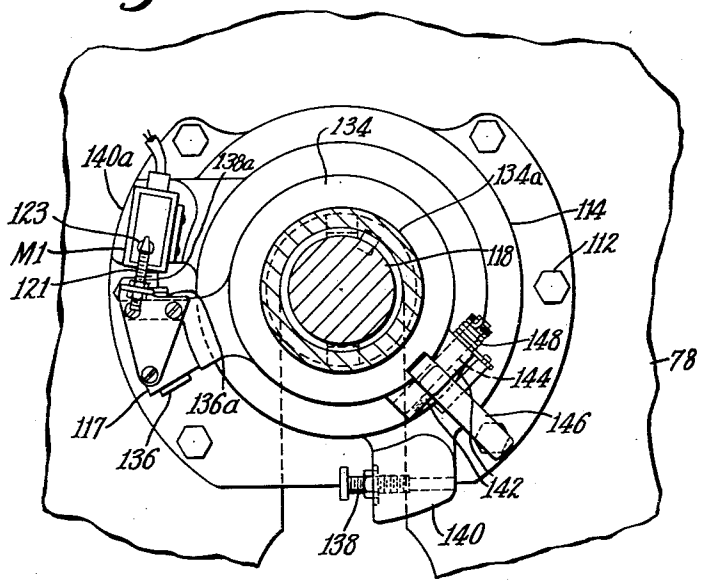
140a
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Fig. 10

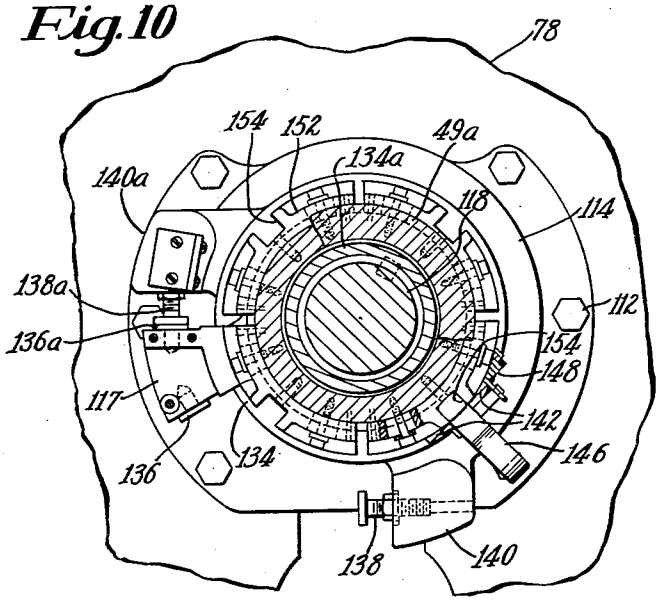
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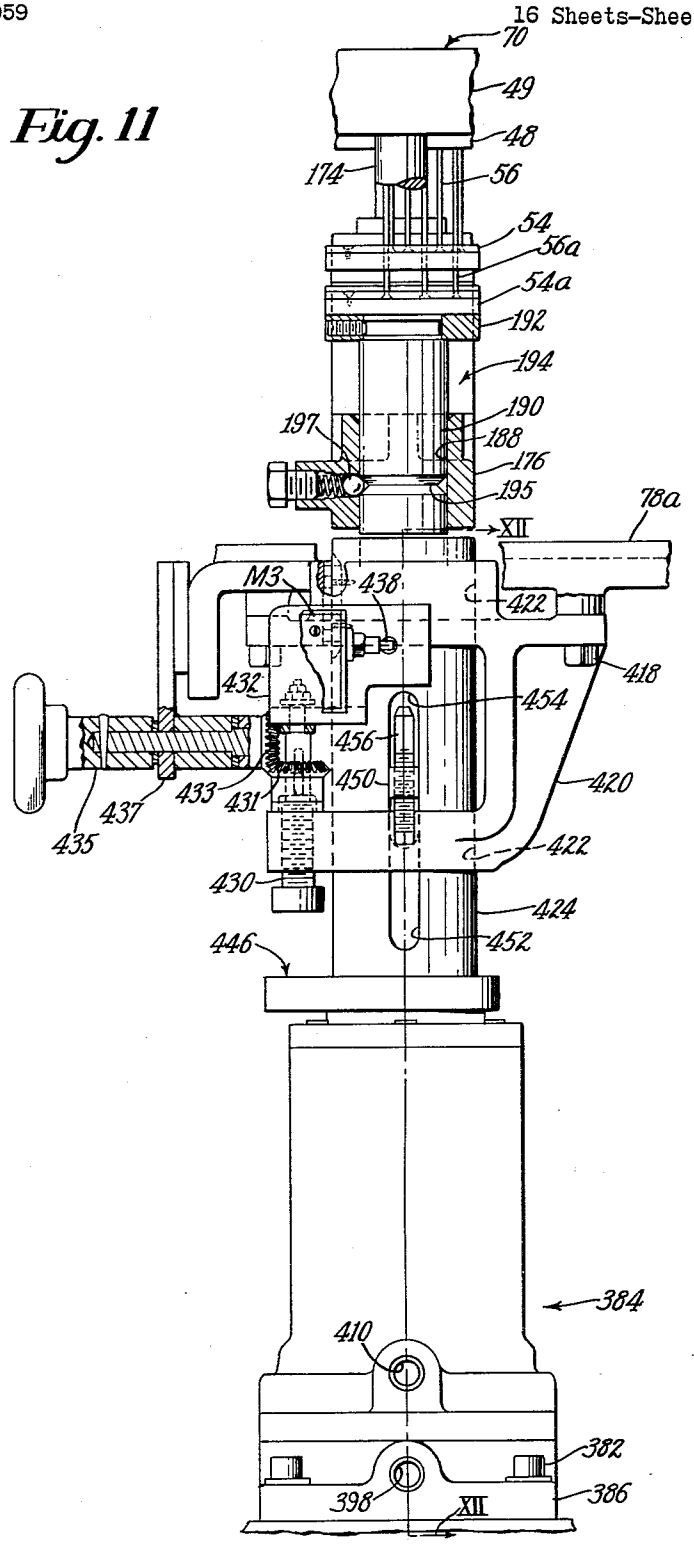
Fig. 11


70
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424
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HEEL ATTACHING MACHINES

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Fig. 12

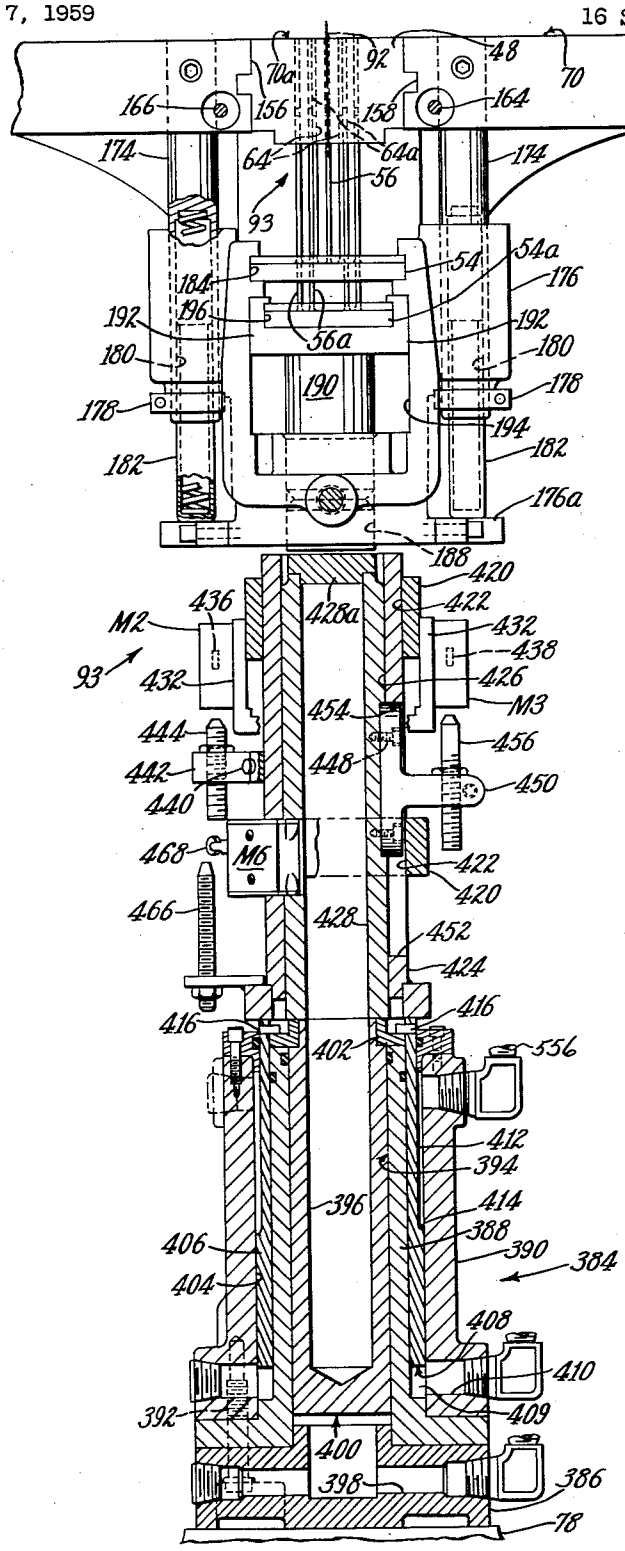

Fig. 13

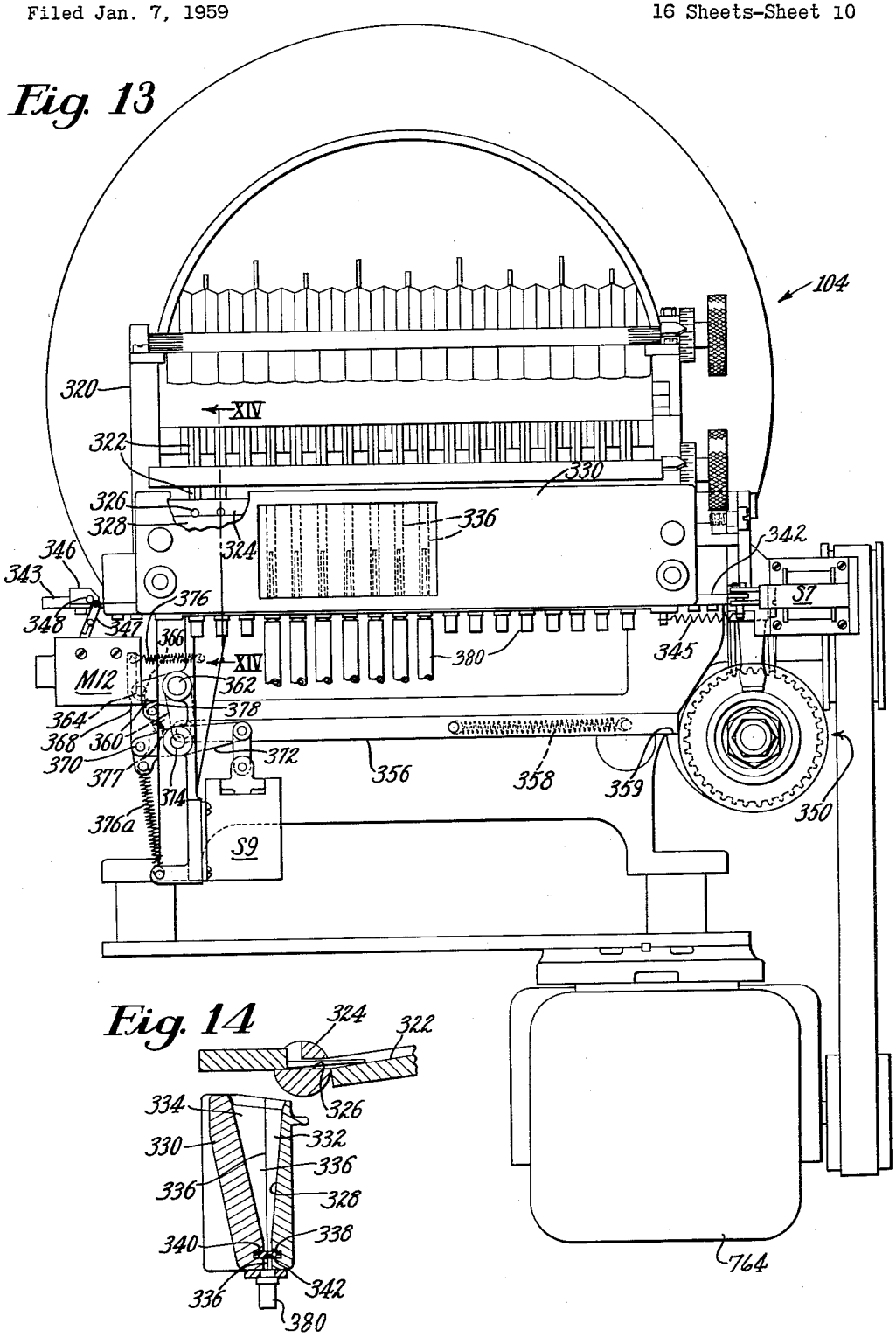
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Fig. 14

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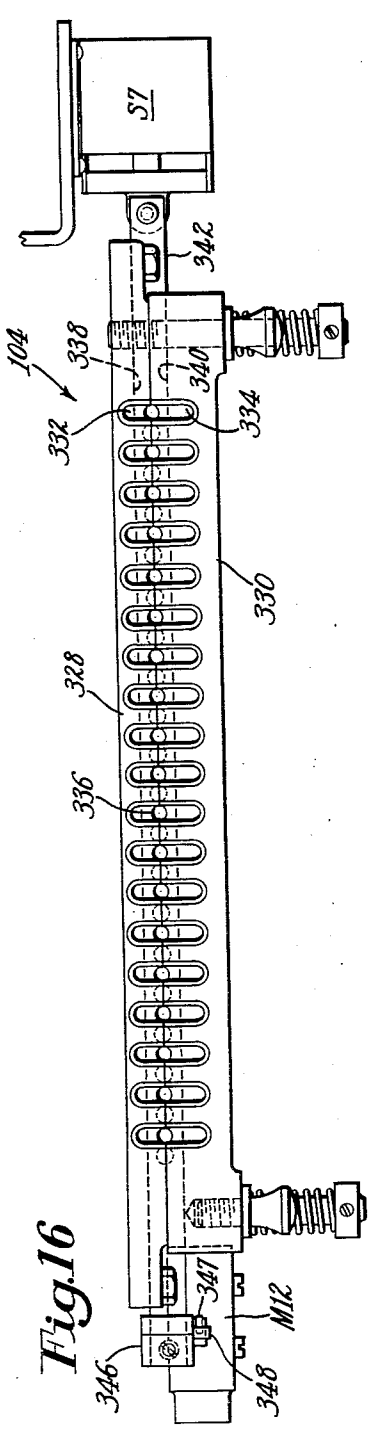

Fig. 16

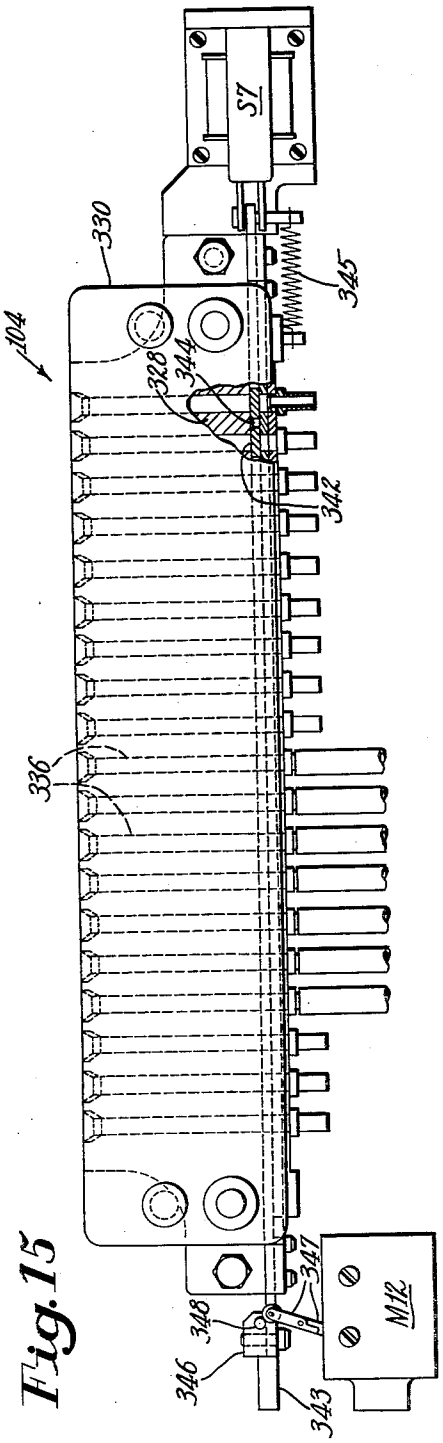

Fig. 15

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Fig. 19

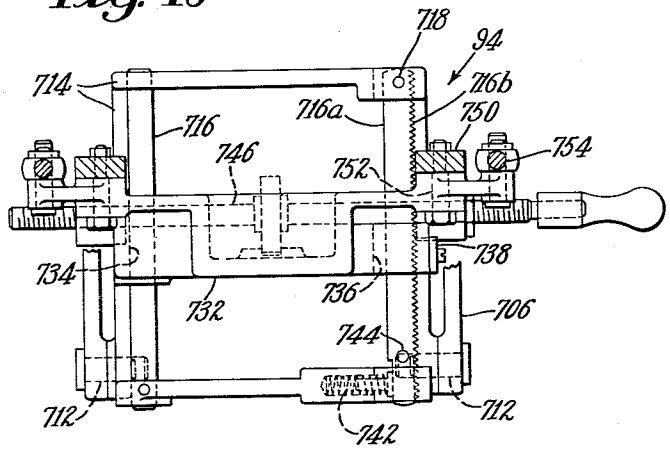


Fig. 17

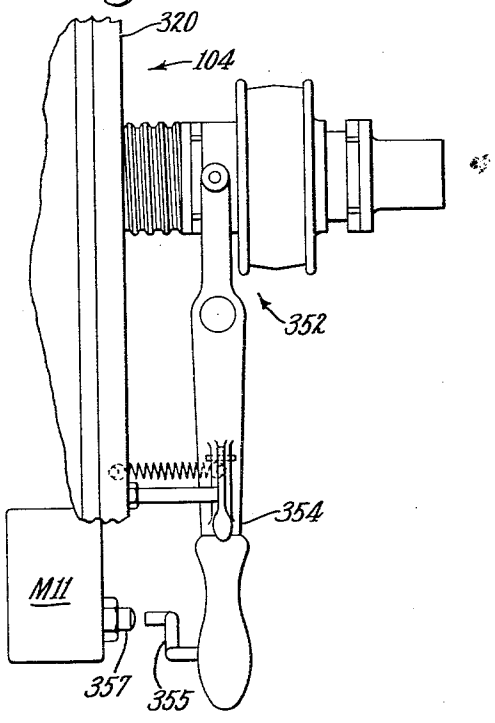


Fig. 18

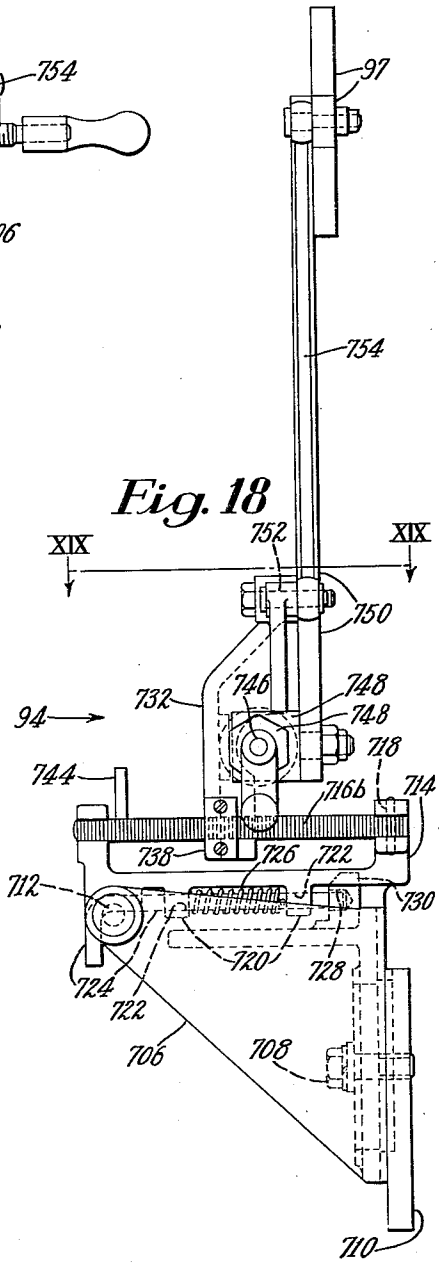
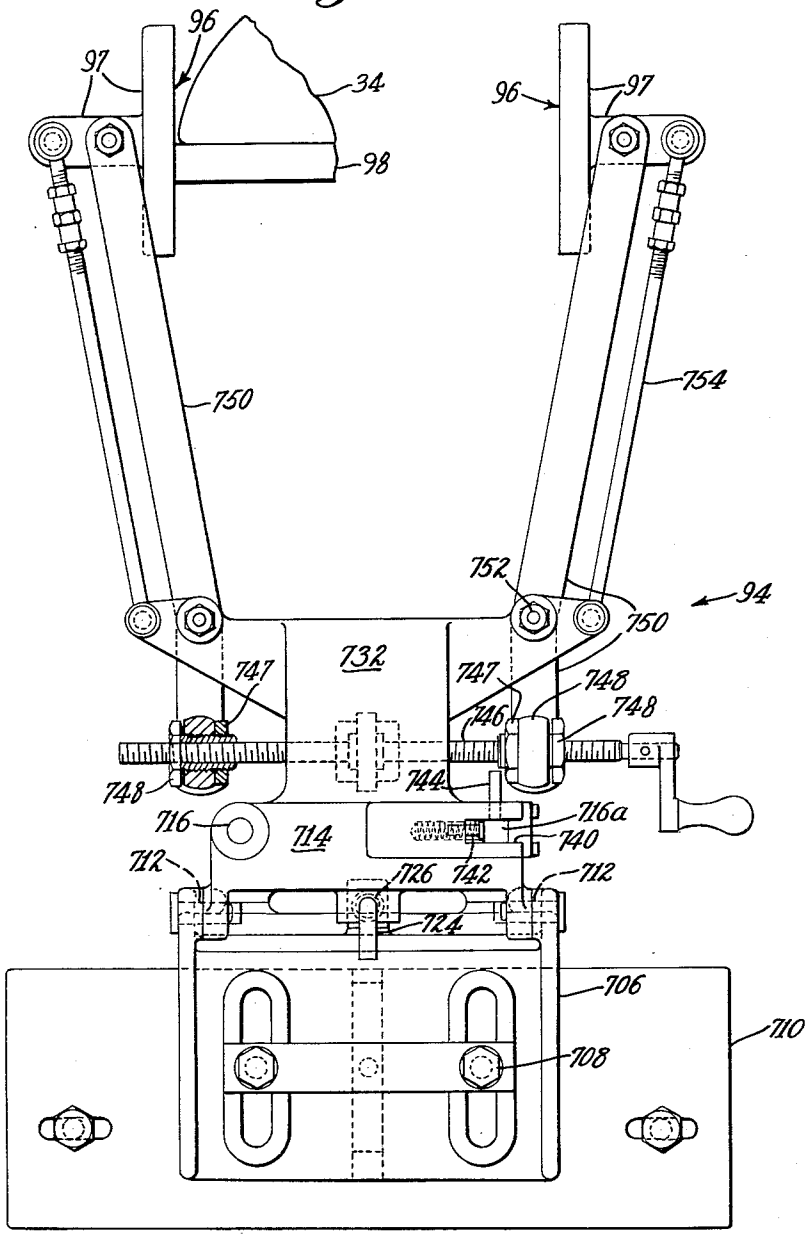


Fig. 20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HEEL ATTACHING MACHINES

Filed Jan. 7, 1959

Fig. 22

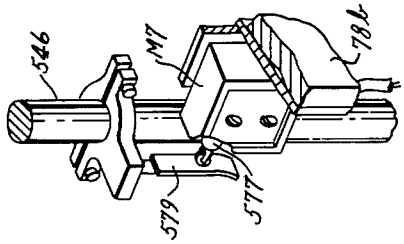

Fig. 21

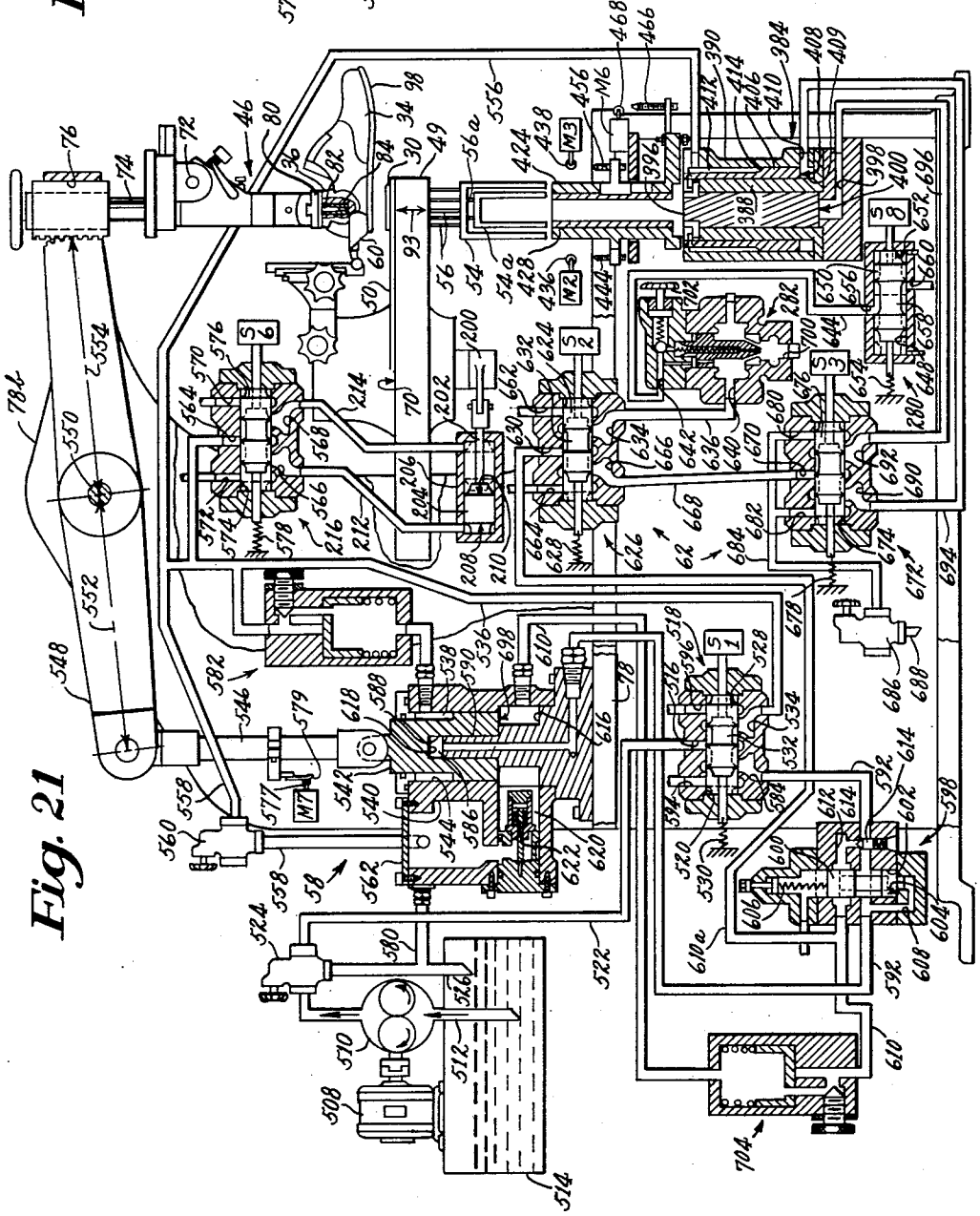

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Fig. 23

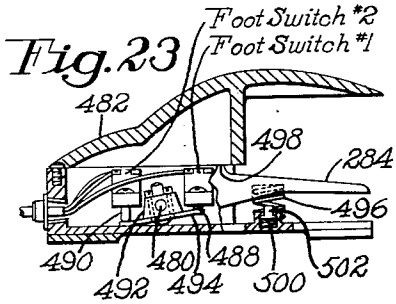
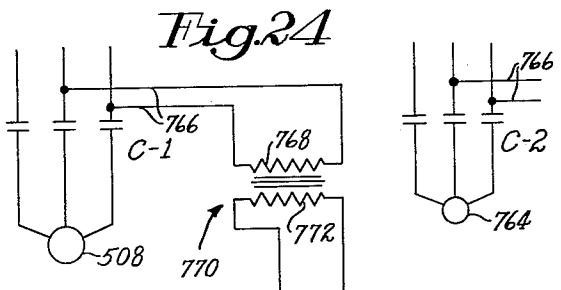
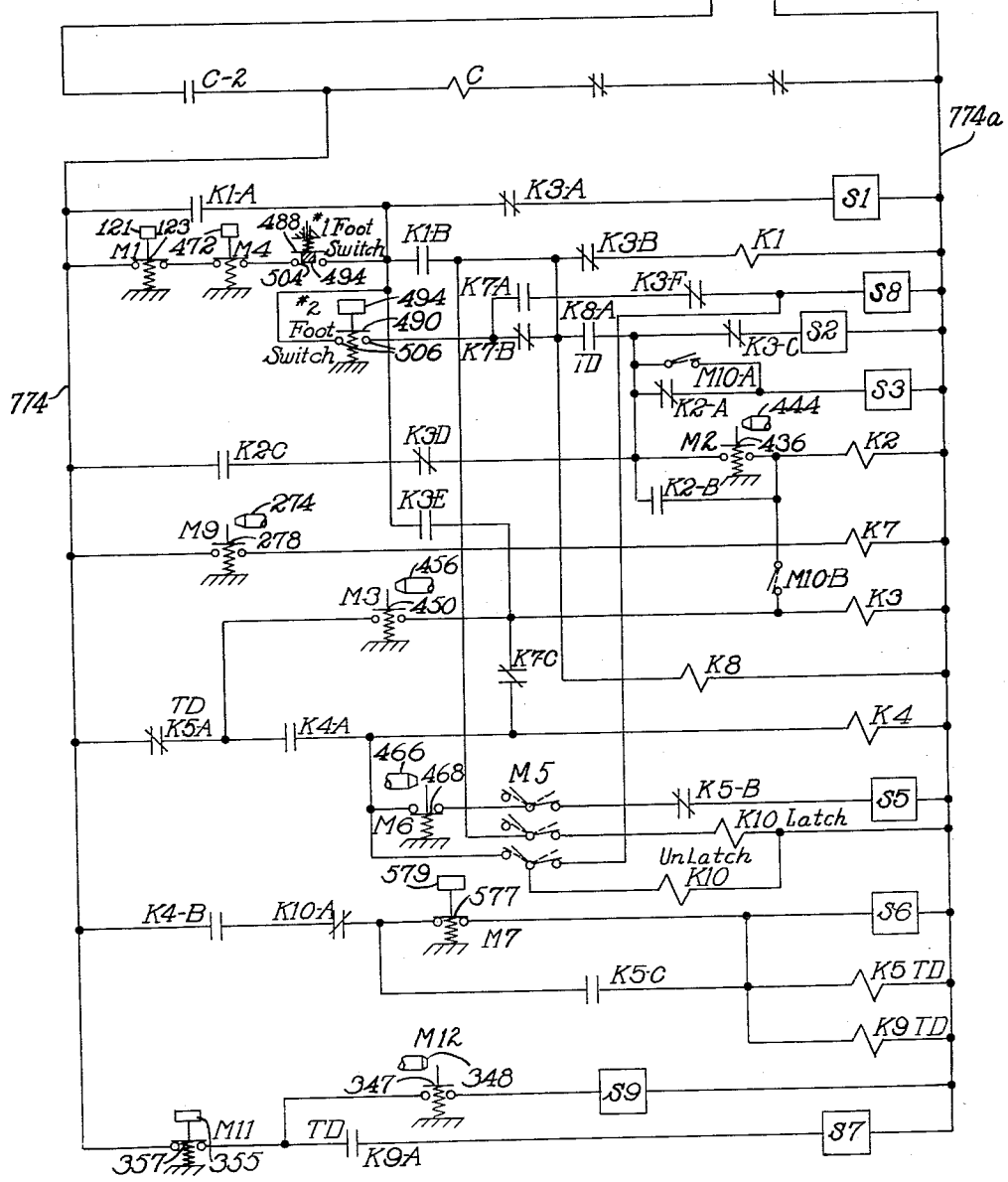


Fig. 24





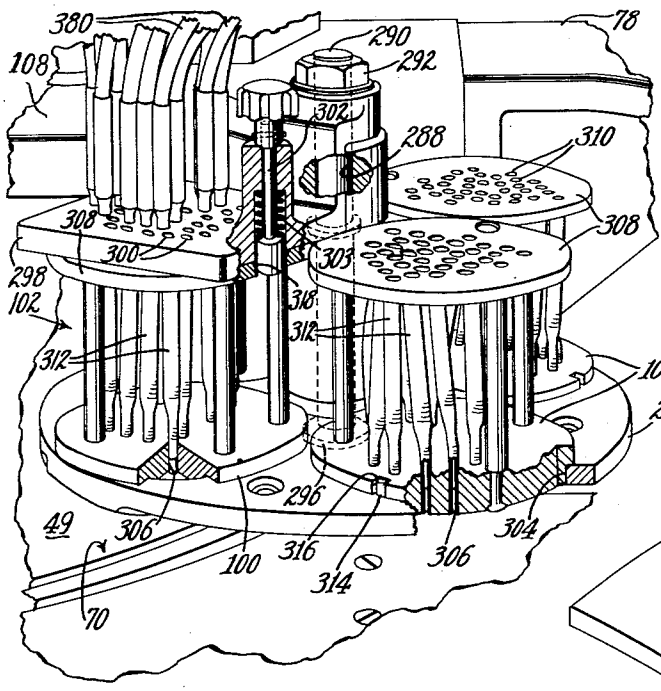


Fig. 25

Fig. 26

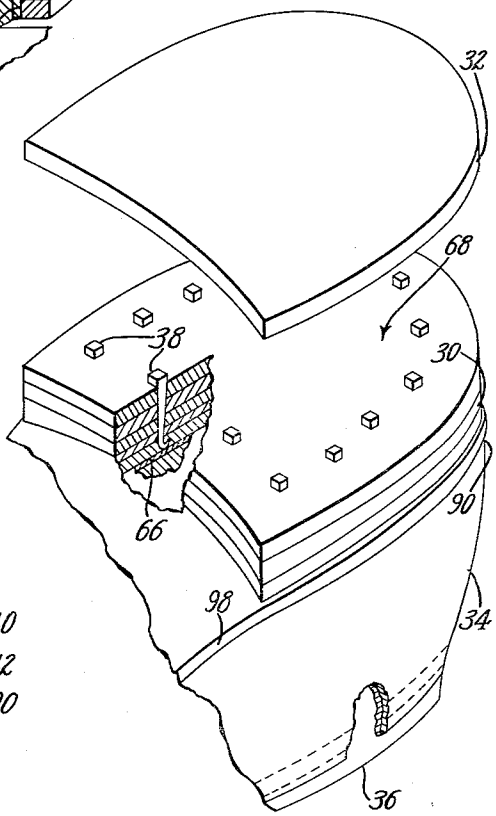
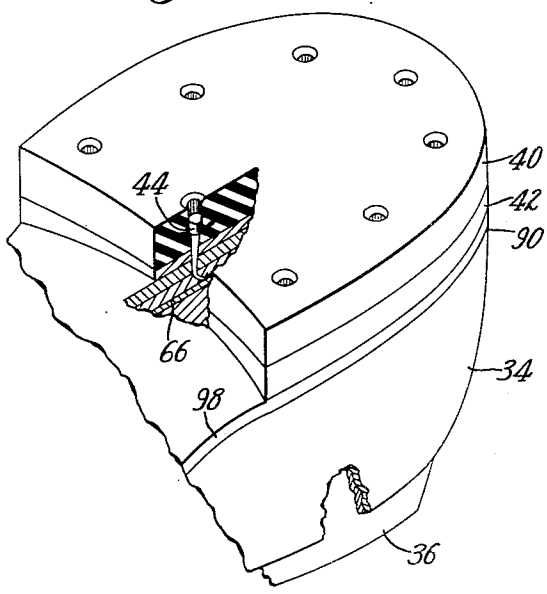


Fig. 27



United States Patent Office 2,994,882 Patented Aug. 8, 1961

2,994,882

HEEL ATTACHING MACHINES

William F. MacKenzie, Hamilton, and Ferman N. Lee, deceased, late of Danvers, Mass., by Dolores R. Lee, executrix, Binghamton, N.Y., assignors to United Shoe Machinery Corporation, Flemington, N.J., a corporation of New Jersey

Filed Jan. 7, 1959, Ser. No. 785,462
20 Claims. (Cl. 1—139)

This invention relates to machines for attaching rubber heels and leather heels and their toplifts to shoes by "outside" nailing and is illustrated as embodied in an improved machine of the general type disclosed in United States Letters Patent No. 2,746,046, granted May 22, 1956, on an application filed in the names of Ferman N. Lee, William F. MacKenzie, Alfred C. D'Arcey and Alfred C. Cicchetti.

The machine disclosed in said Patent No. 2,746,046 is provided with a nailing die, which has driver passages extending through it, and nail drivers which slidingly fit in said passages and at all times are assembled with the nailing die for installation as a unit in a pair of cavities formed in the frame of the machine. Nails are supplied to the nailing die from a tube holder by the use of a loader block which has nail passages formed in it and is moved between a loading position beneath the tube holder and a "dumping" position above the nailing die. The passages of the associated nailing die and the loader block are of the same pattern, four nailing die and driver units and four loader blocks corresponding respectively to said units being necessary to accommodate a complete "run" of sizes. In most factories the shoes arrive at the machine on racks, said shoes usually being of "split" sizes, and accordingly it is necessary frequently to change the nailing die and driver unit and the loader block of the machine to accommodate the shoes with the result that the production of the machine is materially reduced.

It is an object of the present invention to provide a machine which will quickly and effectively attach rubber heels and leather heels and their toplifts to shoes and which has none of the above-mentioned drawbacks. With the above object in view, and in accordance with a feature of the present invention, the illustrative machine is provided with a turret having mounted on it in circumferentially spaced relation a plurality of nailing die and driver units which are of different patterns and are adapted to accommodate a complete "run" of sizes of shoes, said turret being rotatable into different initially operative positions so that the operator may quickly and effectively move any one of the nailing die and driver units into an active operating position at a heel attaching station of the machine. By providing such a construction the time consuming changeover referred to above of the nailing die and driver units, now used in present commercial machines as well as in the machine disclosed in said Patent No. 2,746,046, is avoided. In order to eliminate in the present machine the use of the loader block and the necessity of changing said block as above explained, to accommodate a full "run" of sizes of shoes, the turret, in accordance with another feature of the invention, is automatically rotated in one direction to move the active nailing die of the turret beneath the tube holder to receive a load of nails and in an opposite direction to move the nailing die back to the heel attaching station.

In the attachment of the leather heel to the shoe by the use of the present commercial machines heavy pressure is exerted against the last upon which the shoe is mounted in order to hold it against the force imparted to the shoe by the heel attaching nails which are all driven simultaneously into the heel and the heel seat of the shoe and are clinched against the heel plate of the last, the pressure

exerted on the last during this operation often being sufficient to break the last. It is another object of the present invention to reduce the pressure applied to the last during the attachment of the leather heel to the shoe. With this object in view and in accordance with another feature of the present invention the illustrative machine is provided with primary and secondary sets of drivers, fluid pressure operated means for actuating said sets of drivers in succession, and mechanism hereinafter described for insuring that all the nails shall be driven to the same depth into the work.

The present invention consists in the above novel features and in novel features which are hereinafter described and are directed to improvements in the automatic control of a heel and toplift carriage of the machine, means for selectively setting up the machine to operate either on rubber or leather work, and means for improving the feeding of nails to the tube holder of the machine, reference being had to the accompanying drawings which illustrate one embodiment of the invention selected for purposes of illustration, said invention being fully disclosed in the following description and claims.

In the drawings,

FIG. 1 is a perspective view from the front and the left of the illustrative machine;

FIG. 2 is a right side elevation, partly broken away and partly in section, of the machine;

FIG. 3 is a perspective view showing the interior of a portion of the machine, a front cover of which has been removed;

FIG. 4 shows in front elevation, partly broken away and partly in section, a turret with sets of nailing die and driver units mounted on it, a vertical shaft which is journaled for movement about an axis, and means for securing the turret in different operating positions to the shaft and for disconnecting it from said shaft;

FIG. 5 is a plan view, partly in section, on the line V—V of FIG. 2 showing a carriage for a heel and a toplift arranged above the turret, and mechanism for use in positioning the heel and the toplift over an active nailing die which is mounted in the turret and is arranged at a heel attaching station of the machine;

FIG. 6 is a view showing portions of the carriage actuating mechanism of the machine as viewed from the rear;

FIG. 7 is a view similar to a portion of FIG. 5 showing a carriage adapted to support a rubber heel which is to be attached to a shoe, said carriage at all times remaining in a fixed operating position;

FIG. 8 is a view, partly in section on the line VIII—VIII of FIG. 5, showing details of the vertical shaft and the turret;

FIGS. 9 and 10 are sections on the lines IX—IX and X—X of FIG. 8 respectively;

FIG. 11 is a view, partly in side elevation and partly in section of nail driving mechanism and fluid pressure actuated means for operating said mechanism;

FIG. 12 shows the mechanism illustrated in FIG. 11 partly in side elevation and partly in section on the line XII—XII of FIG. 11;

FIG. 13 is a front view of a nail distributor of the illustrative machine;

FIG. 14 is a section on the line XIV—XIV of FIG. 13 showing a nail conduit and a nail roll from which nails are dumped into said conduit;

FIG. 15 shows in front elevation, on an enlarged scale and partly broken away, portions of the distributor shown in FIG. 13;

FIG. 16 is a plan view of the portion of the distributor shown in FIG. 15;

FIG. 17 is a plan view of a portion of the right side of the nail distributor showing clutch mechanism in-

cluding a lever for controlling vibration of the the distributor and also showing a switch which is operative in response to movement of said lever;

FIG. 18 is a side view of a gage which is used for centralizing the heel seat of the shoe with its heightwise median longitudinal plane in alinement with a vertical median plane of an active nailing die at the heel attaching station of the machine;

FIG. 19 is a plan view on the line XIX—XIX of FIG. 18;

FIG. 20 is a front view of the gage shown in FIG. 18;

FIG. 21 is a schematic diagram showing fluid pressure means for operating the illustrative machine;

FIG. 22 is a detail view of a switch which is operative in response to movement of a jack actuating control rod and is also shown in FIG. 2;

FIG. 23 is a view showing in detail a treadle of the machine;

FIG. 24 is a wiring diagram for use in describing the operation of the machine;

FIG. 25 is a perspective view of a battery of four tube holders which are mounted on a platform and any one of which may be selectively moved to an active position beneath a foot plate of nail distributing mechanism of the machine;

FIG. 26 is an exploded view, partly broken away and partly in section, showing in perspective the rear end of a shoe to which a leather heel has been attached by the use of the illustrative machine and also showing a toplift which is to be "spanked" onto the heel; and

FIG. 27 is a perspective view, partly broken away and partly in section, of a rear portion of a shoe to which a rubber heel and its base lift have been attached by the use of the machine.

The illustrative machine is described with reference to the attachment of a leather heel **30** and its toplift **32** to the heel seat of a shoe **34**, which is mounted on a last **36**, by the use of cut nails **38** (FIG. 26) and also with reference to the attachment of a rubber heel **40** (FIG. 27) and a base lift **42**, which is "spotted" thereto, to the heel seat of the shoe by the use of headed nails **44**.

The machine comprises a jack or support **46** (FIGS. 1, 2, 3 and 21) upon which the shoe **34** on the last **36** is mounted an active nailing die or support **48** which is mounted on a turret or carrier **49**, a carriage **50** (FIG. 5) for positioning and holding the leather heel **30** and its toplift **32** over the active nailing die, or a modified carriage **50***a* (FIG. 7) for positioning and holding the rubber heel **40** and the associated base lift **42**, over said die, upper and lower driver heads **54**, **54***a* (FIGS. 3, 11, 12 and 21) to which are secured primary and secondary nail drivers **56**, **56***a*, fluid pressure means **58** (FIG. 21) for causing the heel seat of the shoe **34**, which is positioned on the jack **46** by a back gage **60**, to be depressed against the leather heel **30** in the carriage **50** or against the base lift **42**, which is "spotted" to the rubber heel **40** and may be regarded as part of the rubber heel, in the carriage **50***a*, and fluid pressure means **62** (FIG. 21) for raising the drivers **56**, **56***a* to cause the nails **38** in passages **64**, **64***a* (FIGS. 3, 5 and 12) of the nailing die **48** to be driven into the heel, or for raising the drivers **56** to cause the nails **44** then in the passages **64** of the nailing die **48** of a type used in operating upon rubber work to be driven into the rubber heel **40** and its base lift **42**, and into the heel seat of the shoe **34**, the pointed ends of the nails being clenched against a heel plate **66** of the last **36**. The rubber heel **40** and its base lift **42** will be hereinafter referred to as a composite rubber heel **40**.

In the attachment of the leather heel **30** to the shoe **34**, the nails **38** are left projecting beyond a toplift receiving face **68** (FIG. 26) of the heel. As will be hereinafter explained, the toplift **32**, during a succeeding stage of the cycle of the machine, is attached to the heel **30** by "spanking" it onto the heel by the application of downward pressure of the heel, which then forms part of the shoe **34**, against the toplift mounted in the carriage **50***a* and supported by the active nailing die **48**. The carriage **50** is swung over a flat upper face **70** of the turret **49** and a flat upper face **70***a* (FIGS. 5 and 12) of the nailing die **48** and, preparatory to carrying out the heel attaching and toplift "spanking on" operations, is arranged to dwell over said die in active positions in which the heel **30** and the toplift **32** positioned and held in the carriage **50** are positioned respectively over the active nailing die.

The jack **46** is journaled upon a bearing pin **72** (FIGS. 1, 2 and 21) carried by a guide bar **74** which is mounted for movement along a vertical guideway **76** formed in a main frame **78** of the machine. Adjustably mounted upon the lower end of the jack **46** is a spindle plate **80** (FIG. 21) provided with a last pin **82** adapted to be interengaged by a thimble **84** of the last **36** upon which the shoe **34** is mounted. The shoe **34** on the last **36** is manually presented, bottom down and rear end away from the operator, to the jack **46** with the thimble **84** of the last in interengagement with the last pin **82** of the jack, said jack having operatively connected to it by a chain **86** (FIGS. 1 and 2) a slidable mount **88** for the back gage **60**, the shoe being swung rearward together with the jack until the rear end of a rand crease **90** (FIGS. 26 and 27) of the shoe engages a lower edge of said gage which serves to position the shoe lengthwise in the machine. The mount **88** of the back gage **60** may be initially adjusted heightwise, widthwise and forwardly and rearwardly of the machine by mechanism well known in the art.

In order to assist the operator in the positioning of a heightwise median plane of the heel seat of the shoe on the jack **46** in a vertical median plane **92** (FIG. 12) of the active nailing die **48** at a heel attaching station **93** (FIGS. 1, 3, 5 and 12) there is provided a breast gage **94** (FIGS. 1, 18, 19 and 20) a face **96** of one of a pair of T-shaped plates **97** of which is adapted to be engaged by the edge of an outsole **98** (FIG. 20) of the shoe **34** at its break line.

As will be hereinafter described, at the end of the heel attaching operation the active nailing die **48** mounted in the turret **49** is swung beneath a stepped lower plate **100** (FIGS. 3, 4 and 25) of an active tube holder **102** of a battery of tube holders to receive the nails **38** or **44** delivered from a nail distributor **104** generally similar to the nail distributor disclosed in United States Letters Patent No. 1,005,303, granted October 10, 1911, on an application filed in the name of Joseph H. Pope and improved as disclosed in United States Letters Patent No. 2,319,797, granted May 25, 1943, on an application filed in the name of Wallace M. Cutler.

The main frame **78** of the machine, which, as above explained, is similar in many respects to the machine disclosed in Patent No. 2,746,046, comprises a table portion **78***a* (FIGS. 1, 2 and 3), which houses most of the fluid pressure operated means of the machine, and an upstanding portion **78***b* upon which the jack **46** and operating mechanism therefor are mounted and to which the nail distributor **104** and nail transfer mechanism are secured.

Secured by screws **106** (FIGS. 2, 3, 4 and 6) to the upstanding portion **78***b* of the main frame **78** of the machine is an upper bearing housing **108** having mounted in it an upper roller bearing **110** (FIG. 4) and secured by screws **112** to the table portion **78***a* of the main frame is a lower bearing housing **114** having mounted in it a lower roller bearing **116**. Secured to a vertical shaft **118** are upper and lower bearing sleeves **120**, **122** having angularly disposed faces respectively adapted to engage the roller bearings **110** and **116**, the construction and arrangement being such that the shaft is journaled for rotation about a fixed vertical axis **124** and is confined against axial displacement. Threaded onto the upper and lower portions of the shaft **118** and in enforced engagement with the upper bearing sleeves **120**,

122 are nuts 115, 119 respectively. The vertical shaft 118 has secured to it by screws 126 a collar 128 having adjustably secured to it a stop screw 130 the purpose of which will be explained later.

Keyed to the vertical shaft 118 and resting on the lower bearing sleeve 122 is a coupling 132 (FIGS. 4 and 8) having tongues 132*a* (only one shown) which interfit with grooves formed in a bearing sleeve 134. The bearing sleeve 134 has formed integrally therewith a radially projecting lug 117 (FIGS. 4, 8, 9 and 10) into which are threaded stop screws 136, 136*a* which, when the shaft is rotated counterclockwise and clockwise, as viewed from above, about the axis 124, are adapted to engage respectively stop screws 138, 138*a* adjustably secured to bosses 140, 140*a* on the lower bearing housing 114. The bearing sleeve 134 has formed on it a pair of spaced bosses 142 provided with bores in which a bearing pin 144 is secured, and journaled on said pin is a latch 146 which is normally urged counterclockwise, as viewed in FIG. 4, by a spring 148 (FIGS. 9 and 10). As will appear later, when the stop screw 136*a* is in engagement with the stop screw 138*a* the active nailing die 48 is at the heel attaching station 93 and accordingly the machine is ready to start through its cycle. In order to insure that the machine shall not be operated when the active nailing die 48 is not at the heel attaching station 93 the lug 117 has adjustably secured to it a striker 121 (FIGS. 4, 8, 9 and 24) which, when the turret has been moved to its rest position, depresses a plunger 123 of a switch M1 which is carried by the boss 140*a* of the lower bearing housing 114 across terminals of this switch. When the turret 48 is swung out of the above position to receive a load of nails the striker 121 moves out of engagement with the plunger 123 and the switch is opened by spring action, thus cutting off the power for operating the machine, as will be explained later.

The bearing sleeve 134 has an upstanding portion 134*a* (FIGS. 8 and 10) an inner cylindrical face of which engages the shaft 118 and mounted on a wear plate 125 carried by the bearing sleeve is the turret 49 which has a depending apron 49*a* slidingly engaging the outer cylindrical periphery of the upstanding portion of the bearing sleeve. Adjustably secured to the depending apron 49*a* of the turret 49 are circumferentially spaced lugs 152 each having a notch 154 any one of which, upon rotating the turret, may be moved selectively into a position for receiving an arm of the latch 146. With the above construction it will be clear that the turret 49 may be released from the shaft 118 by withdrawing the latch 146 from the notch 154 of one of the lugs 152 and may be secured to the shaft by engaging the latch 146 in any one of the four notches which may be considered as being formed in the turret.

The turret 49 is preferably made of aluminum and has formed in it four recesses 156 (FIGS. 8 and 12) each having parallel notches 158 respectively formed in its opposite sides. The recesses 156 are adapted to receive interchangeably one of a plurality of nailing dies 48 having passages 64, 64*a* of different nailing patterns, the inner ends of each of the nailing dies engaging a stop screw 160 (FIG. 8) threaded into the inner wall of the recess and the outer wall of the nailing die being substantially flush with the periphery of the turret 49. Each of the nailing dies 48 is effectively held in its operating position in the associated recess 156 of the turret by a latch bar 162 (FIGS. 2, 3, 4 and 8) which is journaled on a screw 164 secured to the turret and has a hook portion attached to another screw 166 threaded into the turret. A screw 168 threaded into the latch may be used to force the nailing die 48 against the stop screw 160 in the end wall of the recess.

During the heel attaching operation substantial pressure is applied against the active nailing die 48 of the turret 49 and in order to insure against any deflection of the turret at this time the periphery of the turret has secured to it four circumferentially spaced thrust plates 170 (FIGS. 2 and 3) which, when the turret is in its heel attaching position, engage respectively upstanding platforms 172 secured to the table portion 78*a* of the main frame.

Secured to and depending from the turret 49 at opposite sides of the recesses 156 respectively are guide rods 174 on which is slidingly mounted a yoke 176, said yoke by reason of its weight normally resting upon clamp collars 178 (FIGS. 3, 4 and 12) secured to the rods. Slidingly mounted in bores 180 at the lower ends of the guide rods 174 are spring-pressed pins 182 the lower ends of which bear on lateral flanges 176*a* of the yoke 176 and which normally serve to maintain the associated yoke in its lowered rest position against the clamp collars 178

The yoke 176 has formed in it a pair of channels 184 for receiving the upper driver head 54 having secured to it the drivers 56 upper ends of which extend into the passages 64 of the nailing die 48. The yoke 176 has also formed in it a vertical bore 188 in which is mounted for vertical sliding movement a plunger 190 to the upper end of which is secured a driver head carrier 192 lateral sides of said carrier being in engagement with the inner side walls 194 of the yoke. The carrier 192 has formed in it a cavity 196 for receiving the lower driver head 54*a* to which the drivers 56*a* are secured. The plunger 190 is provided with a circumferential groove 195 (FIG. 11) for receiving a ball check 197 when the plunger 190 has been depressed to a predetermined position. This insures against the plunger 190 contacting any other parts of the machine during the indexing of the turret 49.

The nailing die 48, the upper and lower driving heads 54, 54*a*, and the drivers 56, 56*a* are assembled as a unit in the recess 156 of the turret 49, in the channel 184 of the yoke 176, and in the cavity 196 of the carrier 192, the assembly being secured in an operating position in the turret by the use of the latch bar 162.

As above explained, any one of the nailing dies 48 of the turret 49 together with its associated nail driving mechanism above described may be secured to the shaft 118 in an active position when the machine is in its rest position, by manually moving the latch 146 to a position in which it is withdrawn from the notch 154 formed in one of the lugs 152 of the turret and rotating the turret on the shaft until the selected nailing die and its associated driving mechanism are arranged at the heel attaching station 93 and beneath the jack 46.

Secured to the lower end of the shaft 118 is a crank 200 (FIGS. 4 and 21) pivotally connected to a rod portion 202 of a piston 204 slidingly mounted in a cylinder 206 which is pivotally mounted at 211 on the main frame 78 and has faces 208, 210 open to lines 212, 214 leading to a valve 216 hereinafter described. As above explained, rotation of the shaft 118 and accordingly the turret 49 secured to it, in counterclockwise and clockwise directions, as viewed from above, is limited by the engagement of the screws 136, 136*a* carried by the radially projecting lug 117 of the bearing sleeve 134 with screws 138, 138*a* carried by the bosses 140, 140*a* of the lower bearing housing 114, the stopping positions of the turret in opposite directions being varied by initially adjusting the screws 138, 138*a* in said bosses.

Rotatably mounted upon the shaft 118 between the turret 49 and the collar 128 is a sleeve 218 having a lower flange 218*a* which fits slidingly in a circular rabbet 220 formed in the upper face of the turret, said sleeve, as will be explained later, having attached to it the carriage 50 or 50*a* in accordance with whether leather heels 30 and their toplifts 32 or composite rubber heels 40 are being attached to the shoe. In operating upon leather work the carriage 50, during the first part or stage of the cycle of the machine in which the heel 30 is attached by nails 38 to the shoe 34, is in its full line position shown in FIG. 5 with the leather heel 30 resting beneath the jack 46, and during the last part or stage of said cycle when the

toplift 32 is "spanked" onto the heel, the carriage is in its dash-line position beneath the jack.

The carriage 50 comprises a base plate 222 (FIGS. 3 and 5) provided with a slot 224 in which fits a lug 226 secured to the lower flange 218*a* of the sleeve 218, said base plate being secured to the flange of the collar by a pair of screws 228 which pass through openings in the base plate and are threaded into said base flange. The carriage 50 may be described as comprising a heel receiving unit 230 and a toplift receiving unit 232, rear ends of the heel 30 and the toplift 32 positioned in the carriage being in engagement with rear gages 234, 234*a* which may be initially adjusted into different positions forward and rearward of the carriage to accommodate heels of different sizes. The heel 30 and the toplift 32 are held against the rear gages 234, 234*a* respectively by L-shaped breast gages 236, 236*a* which are slidably mounted in guideways 238, 238*a*. The operator moves the breast gages 236, 236*a* forward by forcing the breasts of the heel 30 and the toplift 32 against said breast gages in order to allow the heel and the toplift to be placed in the carriage 50 and releases them, springs 240, 240*a* forcing the breast gages rearward until the heel and the toplift have been forced respectively against the rear gages 234, 234*a*.

The sleeve 218 has secured to it by screws 242 (FIGS. 3, 5 and 6) an arm 244 having a rectilinear guide channel 246 for receiving a depending flange of an abutment block 248, said block being adjustably secured to the arm by a pair of screws 250 which are threaded into the arm and pass through slots in the block. The abutment block 248 may be adjusted to different operating positions lengthwise of the channel 246, after loosening the screws 250, by the use of a thumb screw 252 which is rotatably mounted in a notch of the block and is threaded into the arm.

When the carriage 50 is in its heel attaching position beneath the jack 46 and a heightwise longitudinal median plane of the heel 30 is coincident with the plane 92 (FIG. 12) through the nailing die 48, the block 248 is in engagement with a pin or detent 254 which is constantly urged to a lowered position by a spring 256 (FIGS. 1, 3, 4 and 6) and is pivotally connected to a plunger of a solenoid S5 secured to the upper bearing housing 108. When, as will be explained, the solenoid S5 is energized, the pin 254 is raised out of contact with the abutment block 248, the sleeve 218 and the carriage 50 rotating as a unit clockwise, as viewed from above, under the action of a spring 258 forward and rear ends of which are attached respectively to a stud secured to the arm 244 and to a screw 260 threaded into the main frame until a stop screw 262 threaded into the arm engages a stop screw 264 threaded into an extension of the bearing housing 108. Just before the arm 244 reaches the limit of its clockwise movement (FIG. 5) a screw 266 secured to the arm engages the rear wall of a slot 268 of a link 270 pivoted to a plunger of a fluid pressure check valve 272. As the arm 244 is swung clockwise (FIG. 5) a striker screw 274 adjustably secured to a plate 276 secured to the arm engages a plunger 278 of a switch M9 (FIGS. 1 and 4) causing, through means hereinafter described, a solenoid S8 (FIG. 21) of a valve 280 to be energized to cause the desired amount of augmented pressure, which is controlled by a relief valve 282 and is additional to the initial or primary pressure, to be applied downwardly to the jack 46 so that nails 38 projecting from the heel 30 may be quickly and effectively "spanked" onto the toplift 32 supported on the carriage 50 when a treadle 284 (FIGS. 1 and 23) of the machine is depressed during the last stage of the cycle of the machine to effect the "spanking on" of the toplift.

The carriage 50 is returned from its "spanking on" position to its position shown in FIG. 5 in response to swinging or indexing of the turret 49 to a position in which the active nailing die 48 receives nails from passages 306 in the lower plate 100 of the active tube holder 102 at a nail receiving station. The active tube holder may be defined as a nail delivering member or a fixed nail loader.

The collar 128, as above explained, has adjustably secured to it the screw 130 and the sleeve 218 has secured to and extending rearwardly from it a block 286. When the carriage 50 is in its "spanking" dash-line position (FIG. 5) the block 286 of the sleeve 218 is in close proximity to the screw 130 of the collar 128, clockwise movement of the carriage 50, as viewed from above, at this time being limited by the engagement of the stop screw 262 mounted on the arm 244 with the stop screw 264 on the bearing housing 108. When the drive shaft 118 has been rotated counterclockwise (FIG. 5) sufficiently to move the turret 49 so that its active nailing die 48 is positioned beneath the lower plate 100 of the active tube holder 102, the screw 130 operating through the block 286 has rotated the carriage 50 sufficiently to move the block 248 of the arm 244 forward of the pin 254. As will be explained later, the solenoid S5 is de-energized while the active nailing die 48 of the turret 49 is being moved toward the tube holder 102, the pin 254 operatively connected to said solenoid being depressed by the spring 256 against the upper face of the abutment block 248 and being moved by said spring to its lowered position shown in FIG. 6 after the block has "run off" the pin 254. It will thus be clear that the carriage 50 is held in its heel attaching position shown in FIG. 5 by the pin 254 when the turret 49 is indexed back to its rest position in which the active nailing die 48 is arranged beneath the jack 46 and until such time as it is desired to move the carriage to its dash-line position preparatory to "spanking" on the toplift 32.

Nail transfer

The upper bearing housing 108 has a bore 288 (FIG. 25) for receiving a bearing screw 290 having a shoulder which is normally held in forced engagement with said bearing housing by a nut 292, a supporting platform 294 having an upstanding sleeve portion being journaled on the bearing screw between the bearing housing and a head 296 of said screw. Mounted on the bearing screw 290 in a predetermined position is a foot plate 298 provided with passages 300 of a plurality of patterns. Slidingly mounted in a boss of the foot plate 298 is a plunger 302, said plunger being constantly urged downward by a spring 303 and extending beyond the under face of said foot plate. The nut 292 is used to clamp the bearing screw 290 and the foot plate 298 in their operating positions to the bearing housing 108. The supporting platform 294 has formed in it four circular openings 304 for receiving respectively the lower plates 100 of the tube holders 102, said lower plates having the above-mentioned passages 306 of the same patterns respectively as those of the passages 64, 64*a* of the nailing dies 48 of the turret. Each of the tube holders 102 comprises an upper plate 308 which is provided with passages 310 of the same pattern as the passages 306 of the foot plate 298, and a plurality of tubes 312 which extend into and connect passages of the upper and lower plates of said tube holders.

In order to position the tube holders 102 upon the supporting platform 294 said platform has secured to it studs 314 which register respectively in notches 316 formed in the lower plates 100 of the tube holders 102. The upper plate 308 of each of the tube holders 102 is provided with a bore 318, the tube holder corresponding to the active nailing die 48 being positioned in its active position beneath the foot plate 298 by swinging, after raising the plunger 302, the platform 294 to move the proper tube holder to its active position beneath the foot plate, said plunger then being released to permit the plunger, acted upon by the spring 303, to engage in the bore 318 of the upper plate of the tube holder and thus to hold the active tube holder and accordingly the platform 294 against movement.

As above explained, the nail distributor **104** is generally similar to the nail distributor disclosed in Patent No. 1,005,303 as improved in Patent No. 2,319,797. The nail distributor **104** comprises a vibrating nail carrier **320** (FIGS. 13 and 17) provided with lower raceways **322**, (FIGS. 13 and 14), a nail roll **324** having passages **326** for receiving the nails **38**, **44** from the raceways, a front wall **328** and a transparent front cover plate **330**, opposite channels 332, 334 in the front wall and the front cover plate respectively forming between them nail conduits **336** adapted to receive nails dumped by the roll. As will be explained later only the nail conduits **336** in use are visible, the other conduits being covered with adhesive paper.

In heel attaching machines now in use it is customary for the operator to glance at the nails delivered to a movable loader block (not shown) of the machine before said nails have been transferred to a nailing die of the machine whereby to insure that the proper number of nails have been delivered to the block. In the present machine in which the nails are delivered to the passages **64**, **64***a* of the nailing die **48** directly from the tube holder **102** it is impossible for the operator to check as to the number of nails which are being delivered to the nailing die. Moreover, it has been found that some nails, for example, those which are slightly defective take more time to slide off the nail roll **324** than do other nails with the result that the nails do not always arrive at the tube holder **102** at the same time. Accordingly, with such an arrangement it is necessary for the nailing die **48** to dwell for a period substantially longer than is desirable when the nails are dumped directly from the nail roll into the nailing die waiting beneath the tube holder.

In order to insure that the nails **38**, **44**, when released, shall drop simultaneously and quickly into the passages **64**, **64***a* of the nailing die **48** waiting beneath the tube holder **102** to receive the nails, and in order that the operator of the present machine may at a glance note that a full set of nails is ready for delivery to the nailing die, the present nail distributor has been modified as hereinafter described.

Slidable in opposite rectilinear guideways **338**, **340** formed respectively in the front wall **328** and the front cover **330** of the nail distributor **104** is a shutter **342** having formed in it a plurality of passages **344** (FIG. 15) equally spaced from each other. The shutter **342** is pivotally connected to a solenoid S7 and is normally positioned with its passages **344** out of register with the upper and lower portions of the nail conduits **336**, as shown in FIG. 15, the solenoid S7 at this time being deenergized and the shutter being held in its rest position against a stop **343** by a spring **345**. Carried by the shutter **342** is a block **346** having secured to it a stud **348** which, when the shutter is in its rest position, has moved a plunger **347** of an impulse switch M12 to its position shown in FIGS. 13, 15 and 16. When the solenoid S7 is energized the shutter **342** is moved to the right (FIG. 15) to a predetermined position against the action of the spring **345** causing the shutter passages **344** to be in register with the upper and lower portions of the nail conduits **336** and accordingly causing the nails resting on the shutter to be delivered to the nailing die **48** waiting beneath the active tube holder **102**. Movement of the shutter **342** to the right does not cause the impulse switch M12 to be closed.

The nail distributor **104** is provided with a one-revolution clutch **350** corresponding to the friction clutch (C) disclosed in Patent 2,319,797 for operating the nail roll **324**, and is also provided with a friction clutch **352** (FIG. 17) corresponding to the clutch illustrated in FIG. 4 of Patent 1,005,303 for controlling movement of an eccentric (not shown) adapted to vibrate the nail distributor, the clutch **352** being controlled by a lever **354** corresponding to the lever (92) disclosed in Patent No. 1,005,303.

When the lever **354** is in its position shown in FIG. 17 in which the clutch **352** is disengaged and the nail distributor is not vibrated, a rod **355** secured to the lever is disengaged from the plunger **357** of a switch M11 and accordingly the plunger is held away from contacts of this switch by spring action. When it is desired to start vibration of the nail distributor **104** the handle of the lever **354**, after depressing an associated latch on said handle, is swung to the left (FIG. 17) by spring action causing the clutch **352** to be engaged. As the rod **355** moves to the left with the handle **354** it presses the plunger **357** of the switch across contacts of this switch.

At the extreme end of the cycle of operation of the illustrative machine the nail roll **324** is rotated to dump nails, which are in the passages **326** of the roll, into the nail conduits **336** and onto the shutter **342** in its rest position.

The clutch **350** is tripped by moving a bar **356** resting on a shoulder **359** of the clutch to the left (FIG. 13) against the action of a coil spring **358** the left end of which is attached to the bar and the right end of which is attached to the distributor frame. The bar **356** is pivotally connected to the lower arm of a bell crank lever **360** journaled on a bearing stud **362** fixed to the distributor frame, the other arm of the bell crank lever carrying a pin **364** which engages a shoulder **366** of a lever **368** journaled at **370** to a lever **372** pivotally mounted on a bearing pin **374** secured to the distributor frame. The lever **368** is urged toward the pin **364** by a spring **376** and has a cam face **377** normally in engagement with a pin **378** secured to the distributor frame. A spring **376***a* attached to the lever **368** assists in maintaining the lever upright and also assists a spring (not shown) of the solenoid S9 in moving a plunger of the solenoid to a retracted position. The lever **372** is operatively connected to a plunger of a solenoid S9 which, when energized, swings the lever **372** clockwise (FIG. 13) causing through the above-described mechanism the bar **356** to be moved away from the shoulder **359** of the one-revolution clutch **350** with the result that the nail roll **324** dumps nails into the nail conduits **336**.

As above explained, as the jack **46** is raised to its starting position at the end of the rubber heel attaching operation or the "spanking on" operation, the turret **49** is swung counterclockwise, as viewed from above, to a position in which the active nailing die **48** is in a waiting position beneath the active tube holder **102**. Just before the nailing die **48** reaches its waiting position beneath the tube holder **102** the solenoid S7 is energized causing nails previously resting on the shutter **342** to drop through the passages **344** of the shutter and into tubes **380** connecting the distributor **104** to the foot plate **298** and through the passages **300** in the foot plate **298**, the passages **310** in the upper plate **308** of the tube holder, the tubes **312** of the holder, and the passages **306** in the lower plate **100** of the tube holder into the passages **64**, **64***a* of the active nailing die **48** with the heads of the nails resting upon the upper ends of the drivers **56**, **56***a* associated with the nailing die. Immediately after this occurs the solenoid S7 is deenergized, the shutter **324** being returned to its closed position shown in FIG. 15 by the spring **345**.

As the shutter **342** returns to its closed position it closes the impulse switch M12 causing the solenoid S9 to be energized and through the above mechanism the one-revolution clutch **350** to be tripped whereby to cause the nail roll **324** to dump nails head first into the nail conduits **336** and onto the closed shutter **342**. As above noted, the front cover plate **330** of the nail distributor **104** is transparent and it is customary for the operator to cover the nail conduits **336**, which are not in use, with tape. With such an arrangement the operator can tell at a glance when a full set of nails **38** or **40** is waiting on the shutter **342** ready for being dumped into the active nailing die **48** during the next cycle of operation of the machine.

Double drive

The drivers **56**, **56***a* resting in the passages **64**, **64***a* of the active nailing die **48** at the heel attaching station **93**, are operated successively in the attachment of the leather heel **30** to the shoe **34** in order to reduce to a minimum during this operation the pressure applied to the heel seat of the shoe and accordingly to the last **36** upon which the shoe is mounted.

Secured by screws **382** (FIG. 11) to the base of the main frame **78** of the machine is a composite housing **384** (FIGS. 11 and 12) comprising a base block **386** and inner and outer concentric cylinder portions **388**, **390** (FIGS. 12 and 21) secured by screws **392** to the base block. The inner cylinder portion **388** of the composite housing **384** has a vertical bore **394** in which a piston **396** is reciprocable, one or more ports **398** in the base block being open to a bottom face **400** of said piston **396**. Downward movement of the piston **396** in the inner cylinder portion **388** of the housing is limited by the engagement of a flange **402** of this piston with the upper end of the inner cylinder portion **388**. Slidable in a ring-shaped chamber **404** formed by the inner and outer cylinder portions **388**, **390** of the composite housing **384** is a sleeve piston **406** having a bottom face **408**, which defines the upper end of a chamber **409** and is open to one or more ports **410** of the outer cylinder portion **390** of the housing, and having a circumferentially slotted portion **412** provided with a face **414** against which pressure is applied as hereinafter explained, to move the sleeve to a lowered position in the housing determined by the engagement of pins **416** secured to and projecting inwardly from the sleeve piston with the flange **402** of the cylindrical piston **396**. With the above construction it will be apparent that downward movement of the sleeve piston **406** under pressure applied against the face **414** of this piston, will cause the cylindrical piston **396** to be moved to its lowered starting position shown in FIG. 12.

The table portion **78***a* of the main frame **78** has secured to it by screws **418** (FIG. 11) a depending yoke-shaped bracket **420** provided with a vertical guideway **422** for slidingly receiving an outer thrust sleeve **424** which, when the machine is idle, rests upon the sleeve piston **406**. Slidingly mounted in a bore **426** of the outer thrust sleeve **424** is an inner thrust sleeve **428** comprising a pressed-on upper cap **428***a*. The outer thrust sleeve **424** is keyed against rotation in the yoke-shaped bracket **420**.

It will be noted that when the inner and outer sleeves **424**, **428** are lowered their upper ends are arranged in a plane slightly below the bottom of the plunger **190** of the driver head carrier **192** and the bottom of the yoke **176**. Accordingly, it will be clear that when the turret **49** is indexed the active nailing die **48** and the associated yoke **176**, the driver head carrier **192**, the upper and lower or primary and secondary driver heads **186**, **198** and their drivers **56**, **56***a* are indexed with the turret as the nailing die is moved to a nail receiving position beneath the active tube holder **102** and back to its rest position.

The yoke-shaped bracket **420** has threaded into it a stop screw **430** which may be set in different adjusted vertical positions with relation to said bracket. The stop screw **430** has at its upper end a reduced cylindrical portion rotatably connected to a carrier **432** which is mounted for vertical sliding adjustment on the yoke-shaped bracket **420** and to which are secured switches M2 and M3, the arrangement being such that the carrier may be raised and lowered on the bracket with the stop screw. The carrier **432** is raised or lowered with the stop screw **430** in order that the lower end of the head of the screw and the plungers **436**, **438** of the switches M2 and M3 respectively, shall be positioned in vertically spaced horizontal planes which are always equidistant from each other. In order quickly and conveniently to set the stop screw **430** and the switches M2 and M3 in different vertically adjusted positions the screw may have splined to it a bevel gear **431** operatively connected to a bevel gear **433** which is secured to a handle **435** rotatably mounted in a plate **437** secured to the table portion **78** of the main frame.

Secured by screws **440** to the outer thrust sleeve **424** is a lug **442** having threaded into it a striker screw **444** which, when an extension face **446** (FIG. 11) of the outer sleeve **424** engages the screw **430**, actuates the plunger **436** of the switch M2 to close the switch, the construction and arrangement being such that the face **446** engages the screw **430** at the same time that the switch M2 is closed.

Secured by screws **448** to the inner thrust sleeve **428** is a lug **450** which fits slidingly in a slot **452** of the outer thrust sleeve **424**, the inner thrust sleeve during the driving action of the drivers **56***a* being raised until the upper end of the lug engages an upper face **454** of the slot in the outer sleeve, at which time the upper ends of the drivers **56***a* are flush with the upper ends of the drivers **56**. The lug **450** has secured to it a striker screw **456** adapted, when the inner thrust sleeve **428** is raised into a position in which the lug engages the upper face **454** of the slot **452**, to depress the plunger **438** of the switch M3 to close this switch and, through mechanism hereinafter described, to cause high pressure fluid to be available for the face **414** of the sleeve piston **406** while the bottom face **408** of this piston is open to oil under relatively low pressure with the result that the sleeve piston is lowered and, by reason of the engagement of pins **416** carried by the sleeve portion with the flange **402** of the piston **396**, retracts the piston **396** to its lowered starting position in which the flange **402** engages the inner cylindrical portion **388** of the composite housing **384**.

In the attachment of leather heels **30** and their top-lifts **32** to shoes **34** oil under pressure is provided for a port **410** and accordingly for the bottom face **408** of the sleeve piston **406** thus causing the piston to be forced upward against the outer thrust sleeve **424** with the result that the upper end of this piston raises the yoke **176** and the nails **38** are driven into the work by the drivers **56**, upward movement of said drivers being limited by the engagement of the face **446** of the outer thrust sleeve **424** with the stop screw **430** and simultaneously therewith closing the switch M2. When this occurs, as will appear later, the sleeve piston **406** is held raised in the work by pocketed pressure hereinafter referred to and oil under heavy pressure is available for the face **400** of the piston **396**, causing this piston to be raised and to raise with it the inner thrust sleeve **428** and the plunger **190** with the result that the drivers **56***a* are raised until the lug **450** carried by the inner thrust sleeve **428** engages the face **454** of the outer thrust sleeve **424** causing upward movement of the drivers **56** to cease. At this time the switch M3 is closed causing the faces **400** and **408** of the piston **396** and the sleeve piston **406** respectively to be open to exhaust and the face **414** of the sleeve piston to be open to pressure whereby to return the sleeve piston to its starting position.

As the sleeve piston **406** is lowered the pins **416** engage the flange **402** at the upper end of the piston **396** causing this piston to be lowered until it engages the upper end of the inner cylinder portion **388** of the composite housing **384**. The inner and outer thrust sleeves **428**, **424** drop by gravity to their rest positions upon the upper ends of the piston **396** and the sleeve piston **406** and the yoke **176** aided by the spring-pressed pins **182** moves to its rest position against the clamp collars **178** and the driver head carrier **192** drops in the yoke to its lowered position in which the groove **195** in the plunger **190** engages the ball check **197**. As the striker screws **444** and **456** move away from the plungers **436** and **438**, respectively, of the switches M2 and M3, these switches open. The spring-pressed plungers **182** may be described as stripper plungers since they serve to extract

the drivers **56**, **56***a* in the event that they have a tendency to bind in the work.

As will be explained later, in the attachment of rubber heels **40** and their spotted base lifts **42** to shoes **34**, manually operated cut-out switches M5 are in their dash-line positions (FIG. 24) and driver cut-out switches M10–A and M10–B are closed thus rendering the piston **396** and accordingly the drivers **56***a* inactive during the heel attaching operation and also rendering inactive certain parts of the machine used in the attachment of leather heels and their toplifts to shoes. In order to attach the composite rubber heel **40** to the shoe **34** oil under pressure is supplied to the bottom face **408** of the sleeve piston **406** to cause, through the mechanism above described, the drivers **56** arranged in a suitable pattern to drive nails **44** into the composite rubber heel **40** and the heel seat of the shoe **34**. When the switch M2 is closed by reason of its being engaged by the striker screw **444**, the sleeve piston **406**, and accordingly the outer thrust sleeve **424**, the yoke **176** and the drivers are retracted.

The carriage **50***a* (FIG. 7) for positioning the composite rubber heel **40** remains in the same position at all times and is provided with a slot **224***a* adapted to receive the lug **226** secured to the sleeve **218**, said carriage being secured by screws **228***a* to the lower flange **218***a* of the sleeve. During the indexing of the turret **49** the sleeve **218** is held stationary by reason of the pull of the spring **258** (FIG. 5) holding the abutment block **248** against the pin **254** which, as will appear later, is not operated during the attachment of the composite rubber heel to the shoe. The carriage **50***a* comprises a pair of undercut guideways **458** in which a heel holder or form **460** fits and has a cavity **462** for receiving the composite rubber heel **40**, said form being secured in position in the carriage by a spring-pressed pin **464** slidable in the carriage and adapted to enter a bore **465** in the form.

Secured to the yoke-shaped bracket **420** is a normally closed switch M6 (FIGS. 1 and 12) which serves as part of control mechanism, hereinafter described, and also insures against energizing the solenoid S5 and accordingly causing the carriage **50** to be moved unless the drivers **56**, **56***a* are in their lowered position. A striker **466** for operating the switch M6 is secured to the outer thrust sleeve **424** and when in its lower position is spaced from a plunger **468** of the switch with the result that the switch is spring closed. When the outer thrust sleeve **424** has been raised slightly from its starting position the striker **466** depresses the plunger **468** causing the switch M6 to open and thus insuring that the solenoid S5 cannot be energized.

The front upper end of the table portion **78***a* of the machine is provided with a cover **470** (FIGS. 1 and 2) and in order to afford access for the inside of the machine there is hinged on the cover a door **472** which may be swung forwardly and downwardly, the door normally being locked in its raised closed position by latches **474**. In order to insure against operation of the machine when the door **472** is open, there is provided a spring-opened safety switch M4 (FIGS. 3 and 24) having a plunger **476** which, when the door is closed, is forced by said door across terminals of this switch. When the door **472** is open the plunger **476** is spring-pressed away from the terminals of this switch and the machine cannot be operated through its cycle.

The machine is operated by the use of the foot treadle **284** which is secured to a bearing shaft **480** (FIG. 23) journaled in a control box **482**. Secured to the control box **482** are normally closed and open foot switches Nos. 1 and 2, respectively, comprising plungers **488**, **490** and secured to the shaft **480** is a block **492** having riveted to it an arm **494** front and rear portions of which are at all times engaged respectively by said plungers. The treadle **284** is constantly urged counterclockwise, as viewed in FIG. 23, by a weak coil spring **496** mounted on an upstanding boss at the base of the control box **482**, said counterclockwise movement of the treadle being limited by a stop face **498** of the box. Housed in a recess of the boss is a relatively strong coil spring **500** on which is mounted a stud **502**, said stud being vertically slidable in said recess and, when the treadle is raised, being in engagement with an inturned flange of the boss. When the operator has depressed the treadle **284** sufficiently to engage stud **502** the arm **494** has been moved to a position recognized by the operator by reason of resistance encountered by the treadle, in which the plunger **488** of the foot switch No. 1 acted on by a spring is allowed to bridge contacts **504** of the foot switch No. 1 and thus to close this switch. As will be explained later, the closing of the foot switch No. 1 causes a solenoid S1 to be energized. As the operator further depresses the treadle **284** the plunger **490** of the foot switch No. 2 is moved by the arm **494** across terminals **506** of this switch thereby causing, by means herein described, the solenoids S2 and S3 to be energized. The successive energizing of the solenoids S1, S2 and S3 renders said fluid pressure means **58**, **62** (FIG. 21) active to cause through mechanism, hereinafter described, the leather heel **30** and its toplift or the composite rubber heel **40** to be attached to the shoe.

Power for operating the fluid pressure means **58**, **62** of the machine is supplied by a motor **508** (FIGS. 21 and 24) which drives a rotary pump **510** having an intake line **512** extending into a sump **514** containing oil, for example. Extending between the pump **510** and a port **516** of a four-way valve **518** having a bore **520** is a pressure line **522** including a relief valve **524** which is normally set to "spill" oil through an exhaust or sump line **526** back into the sump **514** when oil in the pressure line reaches a predetermined pressure. The valve **518** includes a spool **528** slidable in the bore **520** and operatively connected to the solenoid S1 which, as above explained, is energized when the foot switch No. 1 is closed. When the machine is powered and the treadle is in its raised position, the spool **528** of the valve **518** is held in its full line position, shown in FIG. 21, by a compression spring **530**, oil from the pressure line **522** flowing through the port **516**, through a circular channel **532** of the spool **528** and through a port **534** of said valve into a line **536** leading through a throttle valve **582**, hereinafter set forth, to a chamber **538** formed by a cylinder **540** which is secured to the main frame **78**, and a clamp or holddown piston or actuator **542** which is slidable in a bore **544** of the cylinder. The piston **542** is pivotally connected to a rod **546** (FIGS. 2, 21 and 22) an upper end of which is pivotally connected to a rear arm of a rocking beam **548** having trunnions **550** journaled in bearings of the main frame **78**. The forward arm of the rocking beam **550** is pivotally connected to the upper end of the guide bar **74**, the distances **552** and **554** being approximately equal.

The line **536** also leads to a line **556**, which extends to the chamber **412** formed by the sleeve piston **406** and the outer cylindrical portion **390** of the composite housing **384**, and also leads to a line **558** which has interposed in it a relief valve **560** and extends to a reservoir **562**. Furthermore, the line **536** is open to a port **564** of the valve **216** which includes ports **566** and **568** open respectively to the lines **212**, **214** and which includes associated exhaust ports **570**, **572**. The valve **216** is provided with a bore **574** having slidable in it a spool **576** one end of which is operatively connected to a solenoid S6 and the other end of which bears against a compression spring **578**. When the machine is in its rest position the solenoid S6 is deenergized, the spool **576** having been moved to its full-line position by the spring **578**, oil from the pressure line **522** being available for the face **210** of the piston **204** to hold the turret **49** in its heel attaching position controlled by the engagement of the screw **136***a* (FIGS. 9 and 10) car-

ried by the projecting lug 117 of the bearing sleeve 134 with the screw 138*a* on the boss 140*a* secured to the lower bearing housing 114. After the drivers 56, 56*a* have been moved to their lowered positions after the rubber heel 40 or the leather heel 30 and its toplift 32 have been attached to the shot, the solenoid S6 is energized causing the spool 576 of a valve 216 to be moved against the action of the spring 578 to its dash-line position with the result that the oil pressure line 522 is open to the face 208 of the piston 204, the face 210 of this piston being open to the exhaust port 570, and the turret 49 is swung counterclockwise, as viewed from above, to move the active nailing die 48 to its nail receiving position beneath the active tube holder 102. A line 580 connects the upper portion of the reservoir 562 to the sump or exhaust line 526.

In order to time the operation of the solenoid S6 and to insure against energizing this solenoid, when the jack 46 has been lowered from its raised inactive position, there is provided a normally open switch M7 comprising a plunger 577 which, when the jack 46 is raised (the rod 546 at that time being lowered) is engaged by a cam 579 secured to the rod whereby to close the switch. When the jack 46 is lowered from its raised position the cam 579 moves away from the plunger 577 and the switch is opened by spring action.

It will be noted that the line, which extends into the chamber 538 formed by the cylinder 540 and the clamp piston 542, has inserted in it a combined check and throttle valve 582 which allows oil without interference to be supplied to said chamber but which restricts, for reasons hereinafter explained, the flow of oil from the chamber. This valve is identical with the combined check and throttle valve (364) disclosed in Patent No. 2,746,046 and need not be further described herein.

Extending between a port 584 in the four-way valve 518 and a primary chamber 586, which is formed by a bore 588 of the clamp or holddown piston 542 and a vertical cylindrical projection 590 of the cylinder 540 is a branch or holddown line 592 which, when the machine is idle and the solenoid S1 is deenergized as shown in FIG. 21, is open to an exhaust port 594 and which, when the solenoid S1 is energized and has moved the spool 528 of the valve 518 to its dash-dot position, is open to the high pressure line 522. When the spool 528 is in its dash-line position the line 536 is open to an exhaust port 596.

It will be noted that the line 592 includes a passage which extends without restriction to oil through a sequence valve 598. The sequence valve 598, which is of a well-known commercial type, comprises a spool 600 which is slidingly mounted in a bore 602 of the housing of this valve and is constantly urged toward a stop face 604 by a spring 606 the effective strength of which may be varied in accordance with the pressure at which it is desired to have the sequence valve open, such pressure for example in operating on some types of work being in the vicinity of one thousand lbs. per square inch. When the pressure of oil in the line 592 is raised to a predetermined amount oil, which is in a passage 608 of the sequence valve 598 and operates against the lower end of the spool 600, slides the spool in the bore 602 against the action of the spring 606 to its dash-line position, thus rendering oil in the line 592 available for the equalizing or transfer line 610, 610*a*.

A passage 612 formed in the sequence valve 598 extends between the lines 592 and 610 and has extending into it a check valve 614 which prevents oil from flowing from the line 592 to the line 610 but which yields against spring action to allow oil, forced out of a secondary chamber 616 which is formed by the piston 542 and the cylinder 540, to be readily exhausted through the exhaust port 594 at the end of the heel attaching or toplift "spanking on" operation. In view of the foregoing it will be clear that, when the spool 528 of the four-way valve 518 has been moved to its dash-line position, oil from the pressure line 592 is available for the chamber 586 thereby causing pressure, acting against a primary face 618 of the piston 542, to raise said piston and accordingly to lower the shoe 34 positioned upon the jack 36 and thus to force the heel seat of the shoe with primary pressure against the heel 30 mounted in the carriage 50 or 50*a*. As the piston 542 is raised oil enters the chamber 616 through a passage 620 which is open to the reservoir 562 and has interposed in it a one-way check valve 622.

When the normally open foot switch No. 2 which, as above explained, may be closed in response to movement of the treadle 284 to its fully depressed position, remains open, the solenoids S2 and S3, as will be hereinafter explained, remain deenergized and a spool 624 of a four-way valve 626, acted upon by a compression spring 628, is in its full-line position shown in FIG. 21. When the spool 528 of the valve 518 has been moved to its dash-line position in response to partial depression of the treadle 284 and the closing of the foot switch No. 1, oil under pressure in the line 610, after the sequence valve 598 has been loaded, flows through a port 630 of the valve 626, through a circular channel 632 of the spool 624, through a port 634 of the valve 626 and into a line 636 leading to the relief valve 282. The relief valve 282 has a port 640 open to the line 636 and has a port 642 which is open to the port 640 and to a line 644 leading to the valve 280 which has a bore 648 and a spool 650 slidable in said bore. Except when the machine has been set for the "spanking on" of the heel lift 32, as will be hereinafter explained, the spool 650 of the valve 280 is held in its full-line position, shown in FIG. 21, against a stop face 652 by a spring 654, the line 644 being open through a port 656 of the valve and a circular channel 658 of the spool 650 to an exhaust port 660.

When the spool 624 of the valve 626 is in its full-line or rest position, the solenoid S2 at this time being deenergized, an exhaust port 662 is cut off from the line 636 by the spool 624 and an exhaust port 664 is open to a port 666 connected to a line 668 communicating with a port 670 of a drive control valve 672. The drive control valve 672 has a bore 674 in which is slidable a spool 676 operatively connected to the solenoid S3 and normally held in its full-line position shown in FIG. 21 by a compression spring 678. The drive control valve 672 also has ports 680, 682 which are open to a line 684 connected through a pressure relief valve 686 to an exhaust line 688 and has ports 690, 692 connected to lines 694, 696 open to the ports 410, 398 respectively of the composite housing 384.

When the solenoids S1, S2 and S3 are deenergized the line 696 is open to the exhaust port 664 and the line 694 is open to the line 684 which is open through the relief valve 686 to an exhaust line 688, the face 414 of the outer sleeve 406 at this time being open to the pressure line 522. It will be noted that the areas of the bottom faces 408, 400 of the sleeve piston 406 and the piston 396 are substantially the same and each is approximately equal in area to a face 698 of the holddown piston 542.

When the heel seat of the shoe 34 has been forced against the heel 30 with primary pressure, as above described, in response to the energizing of the solenoid S1, oil in the pressure line 522 at this time being open to the face 618 of the piston 542, the operator, if satisfied with the position of the work, fully depresses the treadle 284 causing, by means hereinafter described, the solenoids S2 and S3 to be energized and the spools 624, 676 of the valves 626, 672 to be moved to their dash-line positions (FIG. 21). When this occurs high pressure oil is available for the chambers 616 and 409 with the result that the piston 406 is immediately raised causing, through mechanism above described, the drivers 56 to force the nails 38 or 44 into the heel and the heel seat of the shoe, said nails being clenched against the heel plate 66 of the last 36. As the drivers 56 meet resistance, pressure builds up in the chamber 409 and accordingly in the chamber 616 and this results in substantial pressure being applied

against the large or secondary face **698** of the clamp piston **542** and accordingly causes the shoe **34** to be forced with additional or augmented pressure against the leather heel **30** or the composite rubber heel **40**.

It will be apparent that the piston **542** is operatively connected to the jack **46** for freely reversible and positive movement of the same degree and the sleeve piston **406** is operatively connected to the drivers **56** for freely reversible and positive movement of the same degree. Accordingly, since the area of the face **408** of the sleeve piston **406** is substantially equal to the area of the face **698** of the piston **542** and the pressures in the chambers **409**, **616**, which pressures may vary in accordance with the resistance met in the driving of nails, are equal, it will be clear that the secondary pressure, or pressure in addition to the constant holddown pressure exerted downward by the shoe against the heel supported by the active nailing die **46**, will be substantially equal and opposite to the pressure exerted by the drivers **56** in driving the nails into the work.

It will be noted that, when the drivers **56**, which are operatively connected to the sleeve piston **406**, are driving nails **38** or **44**, the bottom face **400** of the piston **396** is in communication with the line **684** and accordingly no pressure is exerted against this face. When the drivers **56** have driven the nails **38** or **44** into the work, the extent of driving being determined by the engagement of the face **446** of the flange at the bottom of the outer thrust sleeve **424** with the stop screw **430**, the striker screw **444** carried by the outer thrust sleeve has depressed the plunger **436** of the switch M2 with the result that this switch is closed and, as will be hereinafter explained in describing the operation of the machine, energizes a coil K2 of a relay including a normally closed switch K2–A and normally open switches K2–B and K2–C. In operating upon leather work, the switch M10–A being open, the energizing of the coil K2 causes the switch K2–A to be opened and the solenoid S3 to be deenergized and accordingly the spool **676** of the driver control valve **672** to return to its full line position (FIG. 21) under the action of the spring **678**. The energizing of the coil K2 closes the switches K2–B and K2–C and thus provides a holding circuit for the coil K2 when the switch M2 is again opened as the result of the drivers **56** being lowered. When the spool **676** of the driver control valve **672** returns to its full-line position (FIG. 21) the bottom face **408** of the sleeve piston **406** is open to the line **684** but since the relief valve **686** is set for a substantial amount of pressure, said sleeve piston is held in its raised position whereby to hold the nail drivers **56** at the upper end of their driving strokes. The moving of the spool **676** of the driver control valve **672** to its full-line idle position shown in FIG. 21, while the solenoids S1 and S2 are held energized, renders fluid under pressure in the line **668** available for the bottom face **400** of the piston **396** causing this piston to be raised and thus to raise the inner thrust sleeve **428** and accordingly the driver head carrier **192** and the drivers **56***a* until the lug **450** secured to the inner thrust sleeve **428** engages the face **454** of the outer thrust sleeve **424** thereby limiting the upward movement of the drivers **56***a*.

As above explained, the striker screw **456** which is carried by the lug **450** is so positioned on the lug that it operates the plunger **438** of the normally open switch M3 to close this switch when said lug engages the face **454** of the outer thrust sleeve **424**. As will be explained later, the closing of the switch M3 causes to be energized a coil K3 of a relay resulting, among other things, as will be explained later, in the deenergizing of the solenoids S1 and S2 and the movement of the jack **46** and the drivers **56**, **56***a* to their starting positions.

As above explained, in the attachment of composite rubber heels **40** to shoes **34**, only the nail drivers **56** are used, the switches M10–A and M10–B being closed and the cut-out switches M5 being moved to their dash-line positions (FIG. 24). When operating upon rubber work the solenoids S1, S2 and S3 are energized, as above explained in connection with operating upon leather work, as the result of closing the foot switches Nos. 1 and 2 causing the drivers **56** to drive nails **44** into the work. However, when the switch M2 is closed to energize the relay coil K2 as the drivers **56** reach the upper ends of their strokes, the switch K2–A of this relay is opened but the switch M10–A is closed with the result that the spool **676** of the driver control valve **672** is held in its dash-line position until such time as the solenoids S1, S2 and S3 are automatically deenergized as will appear later, thereby insuring that the line **668**, when open to the pressure line **522**, is never open to the line **696** leading to the bottom face **400** of the piston **396**.

Before "spanking" the toplift **32** positioned in the carriage **50** onto the nails **38** left projecting beyond the heel **30** attached to the shoe **34**, it is necessary to swing the carriage to its dash-line position (FIG. 5) in which the toplift is arranged beneath the jack **46** as above explained and also to move the spool **650** of the valve **280** to its dash-line position shown in FIG. 21 in order to render the relief valve **282** effective to build up in the line **636** suitable pressure so that the pressure applied by the heel of the shoe against the toplift during the "spanking on" operation shall be effective.

As above explained, an extension of the base portion of the outer thrust sleeve **424** has threaded into it the striker screw **466** which by reason of being moved away from the plunger **468**, allows the switch M6 to close as said outer thrust sleeve and accordingly the drivers **56**, **56***a* return to their lowered idle positions. As will be explained later, in leather work the closing of the switch M3 causes among other things a switch K4–A of a relay including a coil K4 to be closed. During the first stage of the leather work cycle of the machine in which the heel **30** is attached to the shoe **34** by the nails **38**, the striker screw **466** holds the normally closed switch M6 open but allows this switch to close by spring action just before the outer thrust sleeve **424** reaches its lower starting position. When the switch M6 is closed the solenoid S5 is energized and the pin **254** (FIGS. 1, 3, 4 and 5), operatively connected to the solenoid, is raised as above explained from engagement with the abutment block **248** which is secured to the arm **244**, with the result that the carriage **50**, which is secured to said arm through the sleeve **218**, swings clockwise, as viewed from above, under the action of the spring **258** until the stop screw **262** on the arm engages the stop screw **264** mounted on the main frame. As the arm **244** swings clockwise to move the toplift **32** over the active nailing die **48** and beneath the jack **46**, the striker screw **274** adjustably secured to said arm engages the plunger **278** of the spanking switch M9 and closes this switch with the result that a coil K7 of a relay, including a double throw switch K7–A and K7–B, is operated first to cause the switch K7–B to open and then the switch K7–A to close thus insuring that during the "spanking on" operation the solenoids S2 and S3 shall remain deenergized and accordingly the drivers **56**, **56***a* shall remain inactive, and also energizing the solenoid S8 of the valve **280**. (Switch K7–C of the relay including the coil K7 is opened at this time to insure against K3 being energized.) The energizing of the solenoid S8 causes the spool **650** of the valve **280** to move against the action of the spring **654** to its dash-line position and thus shuts off the line **644** from the exhaust port **660**. When this occurs oil pressure builds up in the relief valve **282** and when such pressure attains a predetermined amount oil is dumped through an exhaust port **700** of this valve. The pressure at which the oil in the relief valve is dumped may be varied by the use of a hand screw **702** which is threaded into a housing of the valve.

The relief valve **282** is of the general type disclosed in United States Letters Patent No. 2,043,453, granted

June 9, 1936 on an application filed in the name of Harry F. Vickers and in United States Letters Patent No. 2,198,049, granted April 23, 1940 on an application filed in the name of Richard W. Dinzl and also in United States Letters Patent Reissue No. 22,099, granted May 19, 1942 on an application filed in the name of Ferris T. Harrington, et al. Since the construction and operation of the relief valve **282** is substantially the same as that disclosed in the above patents no further description herein of this valve is deemed to be necessary. Any one of various other relief valves may be used in place of the relief valve **282**.

When the machine has been set for the "spanking on" of the toplift **32** the solenoid S8 having been energized and the solenoids S2 and S3 having been rendered inoperative, the treadle **284** is depressed and the solenoid S1 is energized causing the pressure line **522** to be opened to the chamber **586** with the result that nails projecting from the heel attached to the shoe are forced with primary pressure against the toplift. Since the spool **650** of the valve **280** is in its dash-line position and the line **644** is cut off from exhaust, pressure build-up in the line **592** causes the spool **600** of the sequence valve **598** to move to its dash-line position thereby allowing oil under pressure, regulated by the setting of the relief valve **282**, to be available for the chamber **616** so as to act against the face **698** of the piston **542** thereby augmenting the primary pressure by pressure great enough to insure that the toplift shall be effectively "spanked" onto the heel of the shoe.

When the toplift **32** has been secured to the heel the operator removes his foot from the treadle **284** causing the solenoids S1 and S8 to be deenergized and the plungers **528** and **650** of the valves **518**, **280** respectively to be moved back to their full-line positions by the springs **530**, **654** with the result that the line **592** is open to the exhaust port **594** and the lines **610** and **610***a* are open to exhaust port **660**. The chamber **538** at this time is open to the pressure line **522** and oil which is in this chamber and is subjected to substantial pressure, for example 50 lbs. per square inch and is regulated by the relief valve **560**, acts to depress the piston **542** to its starting position.

The various exhaust ports and lines are preferably led back to the sump **514** by a common line (not shown). In order to insure against the piston **542** and accordingly the jack **46** moving back too fast to their positions shown in FIG. 21, after the attachment of the heel **30** to the shoe, there is interposed in the line **610** a combined check and throttle valve **704** which is identical with the valve **582**.

Breast gage

The breast gage **94** is supported on an angular bracket **706** (FIGS. 18, 19 and 20) adjustably secured by screws **708** to a plate **710** fixed to the table portion **78***a* of the main frame **78**. Pivotally mounted on coaxial fulcrum pins **712** carried by and extending laterally of the bracket **706** is a base **714** which carries left and right gage supporting rods **716**, **716***a*, the rod **716** being cylindrical and being fixed to the base and the rod **716***a* being hinged at its rear end on a pin **718** secured to the base and having flat upper and lower faces and a serrated outer face **716***b*.

The base **714** has depending from it a pair of lugs **720** having alined bores **722** for receiving a draw pin **724** which is constantly urged rearward by a spring **726**, the rear end of the pin, when the breast gage **94** is in its operating position, engaging in a bore **728** of an upstanding projection **730** of the bracket. When the pin **724** is pulled forward by the operator the base **714** may be swung forwardly and downwardly to an inactive position preparatory to opening the door **472** at the front of the machine.

A mount **732** for supporting the gage **94** is provided with a cylindrical bore **734** (FIG. 19) adapted slidingly to receive the rod **716** and is also provided with a wide bore **736** which is of rectangular cross section and flat upper and lower faces of which are engaged by the upper and lower flat faces respectively of the rod **716***a*. The outer end portion of the bore **736** has bridging it a plate **738** secured by screws to the mount **732** the inner face of said plate having serrations which are similar to those formed on the rod **716***a* and are adapted to be engaged by the serrations on the rod. The forward end of the rod **716***a* fits slidingly in a notch **740** (FIG. 20) of the base **714** and is urged to the right as viewed in FIGS. 19 and 20 by a spring **742** until the serrations of the rod **716***a* engage the serrations on the inner face of the plate **738**. By the use of a pin **744** secured to the rod **716***a*, the rod may be moved to the left away from the plate **738** and the mount **732** slid on the rods **716**, **716***a* of the base **714** to its proper fore and aft position, the pin **744** then being released to enable the spring **742** to move the serrations on the rod **716***a* against the serrations on the inner face of the plate **738** to secure the mount against movement on the base.

The mount **732** has rotatably mounted in it a screw **746** comprising right- and left-hand portions threaded into externally and internally threaded bolts **748** which are screwed onto lower arms of levers **750** journaled upon bearing pins **752** carried by the mount **732**. The bolts **748** may be secured in their operating positions on the levers by nuts **747**. Each of the levers **750** may be initially adjusted on its associated bearing pin **752** with relation to the other lever by adjustment of the bolt **748** on its associated lever and the levers may be moved equal distances toward and away from each other by rotating the screw **746**.

The upper ends of the levers **750** have pivotally mounted on them the T-shaped plates **97** outer ends of which are pivotally connected to rods **754** fulcrumed at their lower ends to the mount **732**. The upper arms of the levers **750** and the rods **754** are of the same length, associated rods and arms being parallel to each other and the faces **96** of the plates **97** at all times being vertically arranged and equidistant from the median vertical plane **92** of the active nailing die **48** at the heel attaching station of the machine. The faces **96** of the T-shaped plates **97** may be moved equal distances in opposite directions by rotating the screw **746** and are engaged by the break line portion of the outsole of the shoe in order to orient the heel seat of the shoe to a position in which its heightwise longitudinal median plane is coincident with the vertical median plane **92** of the nailing die **48**.

Operation-leather work

In order to power the machine, the operator presses a starting button **760** (FIGS. 1 and 3) of a manual motor starter **762** causing a switch C–2 of the starter to close with the result that a nail distributor motor **764** is started and a coil C of a relay is energized to close normally open switches C–1 of this relay and thus to start the pump motor **508**. Power is supplied from a main line **766** to a primary coil **768** of a transformer **770** opposite ends of a secondary coil **772** of which are connected respectively to trunk lines **774**, **774***a* between which are included a plurality of circuits. Preparatory to attaching leather heels **30** and their toplifts **32** to shoes **34** the cut-out switches M10–A and M10–B are manually opened and the selector switches M5 are moved to their closed full line positions shown in FIG. 24.

The machine is provided with the above-mentioned safety switch M4, which is spring opened when the front door **472** is swung forward away from its closed position and which is closed when the front door is closed. The machine is also provided with the safety switch M1 which is closed against spring action when the active nailing die **48** is in its operating position beneath the jack **46** at the heel attaching station **93**.

The shoe 34 is placed on the jack 46 in its loading and unloading position and is then swung rearwardly, the rear end of the rand crease 90 of the shoe 30 being brought into engagement with the back gage 60 and the break line portion of the outsole 98 of the shoe being brought into engagement with one or the other of the faces 96 of the breast gage 94 depending upon whether the shoe is a right or a left, thus insuring that the heightwise longitudinal median plane of the heel seat of the shoe shall be coincident with the vertical median plane 92 (FIGS. 3 and 12) of the active nailing die 48 in its operating position.

The operator then depresses the treadle 284 allowing the foot switch #1 to be spring closed and causing, through a normally closed switch K3–A of a relay including the coil K3, the solenoid S1 to be energized thereby causing the spool 528 of the valve 518 to move to its dash-line position and resulting, as above described, in the lowering of the heel seat of the shoe 34 on the jack 46 against the heel 30 positioned in the carriage 50. In the event that the operator is not satisfied with the position of the work, he removes his foot from the treadle 284 with the result that the foot switch #1 is opened and the solenoid S1 becomes deenergized, the jack 46 being moved to its raised starting position. Although of no significance at this time, it will be noted that as the jack 46 is lowered and the rod 546 is raised the cam 579 attached to the rod is moved out of engagement with the plunger 577 of the switch M7, thus allowing the switch to open under spring pressure.

Having observed that the work is correctly positioned the operator further depresses the treadle 284 thus closing the foot switch #2 and causing, through the normally closed switch K7–B of the relay which includes the coil K7 and through a normally closed relay switch K3–B, a coil K1 of a relay which includes normally open switches K1–A and K1–B, to be energized. The closing of the foot switch #2 also causes a coil K8 of a relay including a normally open time delay switch K8–A to be energized with the result that this switch is closed with a delayed action and solenoids S2 and S3 are energized to move the spools 634, 676 of the valves 626, 672 respectively to their dash-line positions. As above explained, oil in the pressure line 522 is now available for the face 408 of the sleeve piston 406 and the face 414 of this piston is open to an exhaust port 596 of the valve 518 with the result that the sleeve piston is raised and operating through the outer thrust sleeve 424 and the yoke 176 causes the drivers 56 to drive nails 64 into the work. The use of the time delay switch K8–A insures that the work is properly clamped in the machine before the drivers 56 start to drive the nails 38 into the work. The energizing of the relay coil K1 effects the closing of the associated relay switches K1–A and K1–B thus establishing circuits for holding the solenoid S1, the coil K1 and the solenoids S2 and S3 energized, should the operator remove his foot from the treadle 284. The closing of the foot switch #2 also causes a latch coil K10 of a relay including an unlatch coil K10 and a switch K10–A to be energized with the result that this switch is opened so as to keep the line in which it is inserted open when a switch K4–B is closed at the end of the nail driving cycle.

When the drivers 56 reach their upper limits of movement the striker screw 444, which is adjustably secured to the outer thrust sleeve 424, operates the plunger 436 of the switch M2 thus closing this switch with the result that the coil K2 of the relay, which includes the normally closed switch K2–A and the normally open switches K2–B and K2–C, is energized. The closing of the switches K2–B and K2–C of this relay establishes a holding circuit for the coil K2. The opening of the normally closed relay switch K2–A causes the solenoid S3 to be deenergized with the result that the spool 676 of the valve 672 returns under the action of the spring 678 to its full-line position (FIG. 21), thus rendering high pressure oil available for the face 400 of the piston 396 and opening the line 684 in which the relief valve 686 is inserted, to the face 408 of the sleeve piston 406 to hold this piston elevated, the face 414 of the sleeve piston still being open to the exhaust port 596. Pressure applied to the face 400 of the piston 396 causes the drivers 56*a* to drive nails 38 resting in the passages 64*a* of the nailing die 48 into the work, upward movement of the piston 396 being limited by the engagement of the lug 450 secured to the inner thrust sleeve 428 with the face 454 of the outer thrust sleeve 424. At the time that this occurs the striker screw 456 secured to the lug 450 has closed the normally open driver reverse switch M3.

It will be noted that as the drivers 56*a* are raised from their lowered starting positions, the striker screw 466 carried by the outer thrust sleeve 424 engages the plunger 468 of the switch M6, causing the switch to open against spring action thus insuring that the carrier release solenoid S5 cannot be energized so long as the drivers 56, 56*a* are away from their lowered retracted positions and the jack has been moved a substantial distance away from its raised idle position.

The effect of closing the switch M3 is to energize the coil K3 of a relay including the above mentioned normally closed switches K3–A, K3–B and normally closed switches K3–C, K3–D and K3–F and also a normally open switch K3–E as well as to energize the coil K4 of a relay including the normally open switches K4–A and K4–B. The energizing of the coil K3 causes the switches K3–A, K3–B and K3–C to be opened and the solenoids S1 and S2 as well as the coil K1 to be deenergized, the solenoid S3 having already been deenergized, with the result that the jack 46 is raised and the drivers 56, 56*a* are moved to their lowered retracted positions. The opening of the switch K3–D causes the coil K2 to be deenergized and the switches K2–A, K2–B and K2–C to be reset. The switch K3–E is closed to insure that if the foot switch #1 is closed the relay coil K3 will remain energized and accordingly there can be no movement of the jack or the drivers. The reason for opening the relay switch K3–F will be explained later. The energizing of the relay coil K4 causes switches K4–A and K4–B of this relay to close, the closing of the switch K4–A establishing a holding line for the coil K4 irrespective of whether or not the treadle has been released. The closing of the relay coil K4–B partially sets up a circuit in which the switch M7 is included and which is closed to operate nail loading mechanism, as will appear later, when the switch M7 is closed after the "spanking on" operation. The energizing of the coil K3 has also the effect of deenergizing the relay coil K8 and accordingly opening the associated relay switch K8–A. It will be noted that at this time the relay switch K10–A has not been closed or reset, such resetting taking place after the unlatch relay coil K10 has been energized during the "spanking on" operation, as will be explained later.

As the drivers 56, 56*a* return to their lowered retracted positions and the jack 46 is raised the operator grips the work causing it to move upward with the jack to its raised position. As the jack 46 returns to its raised position the switch M7 is again closed by engagement of the cam 579 with the plunger 577 of this switch but the closing of the switch M7 has no effect at this time since the switch K10–A is still open. As the drivers 56, 56*a* are lowered the switches M2 and M3 are opened but such opening has no effect on the coil K2 which remains deenergized, the coil K3 continuing to be energized through the relay switch K7–C and also through the switch K3–E if the operator should have his foot on the treadle.

As the outer thrust sleeve 424 reaches the lower end of its downward or retracted stroke and the striker screw 466 moves away from the plunger 468 of the switch M6, this switch is allowed to close by spring action causing,

through the closed time delay switch K5–A the then closed relay switch K4–A, the switch M5 and a relay switch K5–B, the carrier release solenoid S5 to be energized, thus raising the pin 254 operatively connected to the solenoid against the action of the spring 256 with the result that the carriage 50 is swung by the action of the spring 258 into its dash-line spanking position in which the stop screw 262 carried by the arm 244 is in engagement with the stop screw 264 adjustably mounted on the main frame 78, the toplift 32 being positioned on the carriage over the nailing die 48 and below the jack 46 at the heel attaching station 93.

As the carriage 50 arrives at its spanking position the striker screw 274 carried by the arm 244 moves the plunger 278 of the spanking switch M9 across the contacts of this switch with the result that a relay coil K7 is energized and the double throw normally closed and open relay switches K7–B and K7–A respectively of this relay are opened and closed and the normally closed relay switch K7–C is opened. The opening of the relay switch K7–C causes the relay coil K3 to be deenergized to insure that the coil shall not be energized during the "spanking on" operation and resulting in the resetting of the various switches of the relay. It will be noted at this point that if the operator should keep his foot on the treadle the relay coil K3 will remain energized through the switch K3–E. Should this happen the switch K3–F would remain open and no spanking would take place until the operator removed his foot from the treadle to permit the relay coil to become deenergized. Opening of the switch K7–B insures against the operation of the drivers 56, 56*a* when the treadle 284 is again depressed to initiate the "spanking on" operation, and the closing of the switch K7–A causes, after the foot switches #1 and #2 are closed and the relay coil K3 has been deenergized the solenoid S8 operatively connected to the spool 650 of the valve 280 to be energized with the result that the spool is moved to its dash-line position against the action of the spring 654 thereby closing the line 644 off from the exhaust port 660 and rendering the relief valve 282 effective to control the pressure of oil in the line 610*a*.

The machine is now ready for pressing the attached heel of the shoe 34 on the jack 48 against the toplift 32 positioned in the carriage 50. To effect this operation the operator depresses the treadle 284 to close the foot switches #1 and #2 thereby energizing the solenoid S1 and, as above explained, moving the spool 528 of the valve 518 to its dash-line position to force the heel attached to the shoe first with primary clamping pressure against the toplift followed immediately by additional pressure. As above explained, when the foot switch #2 is closed the solenoid S8 is energized and the spool 650 of the valve 280 is moved to its dash-line position. It will be noted however that even though the foot switch #2 is closed the solenoids S2 and S3 are cut off from power, the pressure of oil, which is in the line 610, 610*a* and is available for the face 698 of the piston, being controlled by the setting of the hand screw 702 of the relief valve 282. When the solenoid S8 is energized current is available for the unlatch coil K10 of the relay which includes the latch coil K10 and the switch K10–A, with the result that this switch is closed. It will be noted, however, that at this time the switch M7 is open.

After the toplift 32 has been forced onto the attached heel 30 of the shoe 34 the treadle 284 is released causing the foot switches #1 and #2 to be opened and the unlatch coil K10 deenergized, the switch K10–A of this relay remaining closed until the latch coil K10 of the relay is again energized during the next cycle of the machine. The releasing of the treadle 284 also effects the deenergizing of the solenoid S8 with the result that the spool 650 of the valve 280 returns, under the action of the spring 654 to its full-line position shown in FIG. 21 to connect the line 644 with the exhaust port 660. The releasing of the treadle 284 also causes the solenoid S1 to be deenergized and allows the spool 528 of the valve 518 to return to its full-line rest position shown in FIG. 21 to effect the raising of the jack 46 to its starting position.

As the jack 46 returns to its raised starting position the switch M7 is closed with the result that the solenoid S6 and coils K5 and K9 of time delay relays respectively are energized. The energizing of the solenoid S6 causes the spool 576 of the valve 216 to be moved to its dash-line position against the action of the spring 578 with the result that oil under pressure is available for the face 208 of the piston 204 and the turret 49 is swung counterclockwise, as viewed from above, to a position, which is determined by the engagement of the screw 136 carried by the lug 117 of the bearing sleeve 134 with the screw 138 carried by the boss 140 of the lower bearing housing 114, whereby to move the active nailing die 48 beneath the active tube holder 102. As above explained, as the active nailing die 48 of the turret 49 is swung about the axis 124 to its nail receiving position beneath the active tube holder 102 the carriage is swung with said nailing die by reason of the engagement of the stop screw 130 on the collar 128, which is secured to the shaft 118, with the block 286 which is mounted upon the sleeve 218 secured to the carriage.

The time delay relay, which includes the coil K5, comprises a normally closed time delay switch K5–A, a normally closed switch K5–B and a normally open switch K5–C and the time delay relay, which includes the coil K9, comprises a normally open time delay switch K9–A. When the coil K5 is energized the switch K5–C is immediately closed and the switch K5–B is immediately opened to deenergize the carriage release solenoid S5, the switch K5–A being opened with a delayed action to maintain the coil K4 energized and the switch K4–B closed long enough to insure that the active nailing die 48 of the turret 49 shall have been moved beneath the active tube holder 102 with a slight dwell.

When the solenoid S5 is deenergized by the opening of the switch K5–B the pin 254 is depressed by the spring 256 and rests upon the upper surface of the abutment block 248. When the active nailing die 48 of the turret 49 is away from its rest position at the heel attaching station, the safety switch M1 is open to insure against the operation of the jack 48 and of the drivers in the event that the treadle is accidentally depressed. When the nailing die 48 of the turret has been rotated substantially to its nail receiving position the pin 254 associated with the solenoid S5 has dropped down behind the abutment block 248 and the spanking switch M9 has been opened and accordingly the coil K7 is deenergized with the result that the switches K7–A and K7–B are opened and closed respectively to insure that the circuits leading to the solenoid S8 on the one hand and the solenoids S1, S2 and S3 on the other hand are reset preparatory to starting the next cycle of the machine.

As the active nailing die 48 of the turret 49 arrives at its nail receiving position beneath the active tube holder 102, the switch K9–A of the time delay relay including the coil K9 is closed with the result that the solenoid S7 is energized, causing the shutter 342 of the nail distributor 104 to be moved to a position in which the passages 344 of the shutter register with the nail conduits 336 of the nail distributor to allow the nails on said shutter to be delivered to the passages 306 of the lower plate 100 of the active nail tube holder 102 and thus into the pasages 64, 64*a* of the nailing die 48 so that they rest upon the upper ends of the drivers 56, 56*a* in the passages of this die.

After a predetermined time delay the relay switch K5–A is opened causing the relay coil K4 to be deenergized and this results in opening and resetting relay switches K4–A and K4–B. When the switch K4–B is opened the solenoid S6 and the time delay relay coils K5 and K9 are deenergized. When the solenoid S6 is deenergized the

spool 576 of the valve 216 returns to its full-line position shown in FIG. 21 under the action of the spring 578 with the result that the active nailing die 48 of the turret 49 is returned to its operating position beneath the jack 46 and the safety switch M1 is closed. The deenergizing of the relay coil K5 causes the associated switches K5–A, K5–B and K5–C to be reset and the deenergizing of the relay coil K9 results in the opening of the switch K9–A and therefore in the deenergizing of the solenoid S7. When the solenoid S7 is deenergized the nail shutter 342 is returned to its rest position against the stop 343 by the action of the spring 358. As the shutter 342 returns to its rest position it closes the impulse switch M12 causing the solenoid S9 to be energized and the one-revolution clutch 350 of the nail distributor 104 to be engaged whereby to operate the nail roll 324 of the distributor to cause a new load of nails to be dumped into the vertical nail conduits 346 with their heads resting upon the shutter 342.

Rubber work

Preparatory to attaching composite rubber heels 40 to shoes 34 the operator attaches the rubber heel carriage 50*a* (FIG. 7) to the sleeve 218 in place of the carriage 50 and replaces the nailing dies 48 and drivers 56, 56*a* by other nailing dies and drivers adapted to accommodate a complete "run" of rubber work. It will be noted that in the attachment of rubber heels to shoes only seven nails are used and these nails are driven by drivers attached to the upper driver head. It will thus be clear that in the attachment of rubber heels to shoes it is unnecessary to use the inner piston 396, the inner thrust sleeve 428 or the driver head carrier 192. Moreover, there is, of course, no toplift to be spanked onto the heel and with these considerations in view the machine is initially adjusted for rubber work as above explained by moving the multiple selector switch M5 to its inactive or open dash-line position shown in FIG. 24 and by moving the driver cut-out switches M10–A and M10–B to their closed dash-line positions. These changes, as will appear later, eliminate the operation of the "spanking on" mechanism of the machine and render the second drive of the machine inactive.

After placing the composite rubber heel 40 in the carriage 50*a*, the operator places the shoe 34, which is mounted on the last 36, upon the jack 46 and swings the jack into its upright position with the rear end of the rand crease 90 of the shoe engaging the back gage 60 the break line of the outsole 98 of the shoe engaging one of the faces 96 of the breast gage 94 depending upon whether the shoe is a right or a left. The operator then depresses the treadle 284, the foot switch 1 being closed to force the heel seat of the shoe against the composite rubber heel 40 with primary pressure as above explained. When the operator is assured that the work is correctly positioned in the machine the treadle 284 is further depressed causing the foot switch 2 to be closed and, as above explained, energizing the solenoids S1, S2 and S3 to move the plungers 528, 624 and 676, respectively, of the valves 518, 626 and 672 to their dash-line positions. When the drivers 56 have completed their upward movement determined by the engagement of the extension face 446 of the outer thrust sleeve 424 with the stop screw 430 secured to the yoke-shaped bracket 420 the striker screw 444, secured to said outer thrust sleeve, closes the switch M2 with the result that the relay coil K2 is energized and the normally open switches K2–B and K2–C of this relay are closed to complete a holding circuit for the coil K2 in the event that the operator removes his foot from the treadle 282. The enregizing of the relay coil K2 also causes the switch K2–A of this relay to be opened but since the switch M10–A is closed the solenoid S3 remains energized and the plunger 676 of the valve 672 remains in its dash-line position. At the same time that the relay coil K2 is energized current is available through the closed switch M10–B for the coil K3 with the result that the relay switch K3–E is closed and, through the relay switch K7–C the relay coil K4 is energized. The effect of energizing the coil K3 as above explained in connection with operating upon leather work is to cause the jack 46 to be raised from the nailing die 48 and the drivers 56 to be moved to their lowered starting positions, the operator usually removing his foot from the treadle 284 at this time.

The effect of energizing the relay switch K4 is to close relay holding switch K4–A and to close the switch K4–B. As the switch M7 is closed in response to movement of the jack 46 to its raised position above the nailing die 48 the drivers at this time being in their lowered retracted positions, the solenoid S6 and the coils K5 and K9 of time delay relays are energized as above described with the result that the active nailing die 48 is swung with the turret 49 into its nail receiving position beneath the active tube holder 102, the nails being delivered from the shutter 342 and the nail distributor to said die. As the active nailing die 48 is returned to the heel attaching station 93 below the jack 46, the shutter 342 is closed and a new set of nails is delivered onto the shutter from the nail roll 34, as above described.

It will be noted that when the machine is operating upon rubber work the unlatch relay coil K10 is energized at the time that the relay coil K4 is enregized, thereby insuring that the switch K10–A is closed at the end of the nail driving operation. It will be apparent that if the switch K10–A is open at the end of the nail driving operation there will be no indexing movement of the turret 49 to "pick up" the nails. It has been found that occasionally, in operating upon leather work, the operator will attach the heel to the shoe without "spanking on" the toplift with the result that the switch K10–A is left open. When this occurs and the operator changes over the machine for accommodating rubber work, the unlatch relay coil K10 is energized in response to the energizing of the relay coil K4 and, accordingly, the switch K10–A is closed. Should the switch K10–A already be closed the energizing of the unlatch coil K10 will have no effect on this switch.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a heel attaching machine, a nailing die having passages, a primary driving unit having drivers slidingly fitting in a plurality of said passages, a secondary driver unit having drivers slidingly fitting in other of said passages, a fixed stop, a first operating member for moving the drivers of said primary driving unit in one direction until said member engages the stop and for thereafter holding the drivers of said primary driving unit in forced relation with nails driven into the work, a second operating member for moving the drivers of said secondary driver unit in said one direction until said second operating member is stopped by said first operating member, means for rendering said second operating member active when the first member engages the stop, and means responsive to movement of said second operating member to a position in which it is stopped by said first operating member for causing said first and second operating members to be moved respectively away from the primary and secondary driver units.

2. In a heel attaching machine, a nailing die having passages, a first driver head, a first set of drivers secured to said head, a second driver head, a second set of drivers secured to said second driver head, a fixed stop, a first member for moving the first driver head and its associated set of drivers in one direction until said member engages the stop to drive nails into work on the nailing die and for thereafter holding said drivers against the nails, fluid pressure means for operating said first member, a second member for moving said second driver head and its associated set of drivers in said one direction until

said second member is stopped by said first member, fluid pressure means for operating said second member, means for rendering said second-named fluid pressure means active when the first member engages the stop, and fluid pressure means responsive to movement of said second member to a position in which it is stopped by said first member for causing said members to be moved out of operating relation with the driver heads.

3. In a heel attaching machine, a turret which is rotatable about an axis and comprises a nailing die and driver unit, means for indexing the turret about said axis in one direction to move said unit from a heel attaching station to a nail receiving station, a carriage which is mounted on the turret and is adapted to carry a heel and a toplift, a spring for urging the carriage about said axis in a direction opposite to said one direction, means responsive to movement of the turret in said one direction for moving the carriage in said one direction with the turret against the action of the spring to a position in which the heel in the carriage is moved at least to the heel attaching station, a first stop for retaining against the action of the spring the carriage in a predetermined indexed position in which the heel in the carriage is stopped at the heel attaching station, a second stop, and means for releasing the first stop to cause the carriage to be swung on the turret by the spring in a direction opposite to said one direction until the carriage engages said second stop whereby to position the toplift in the carriage at the heel attaching station.

4. In a heel attaching machine, a nailing die arranged at a heel attaching station, a fixed nail delivering member, means for moving the nailing die between the heel attaching station and the nail delivering member, a movable carriage comprising heel and toplift receiving units, a stop, a spring for constantly urging the carriage to a toplift spanking on position which is determined by the stop and in which the toplift receiving unit is arranged at the heel attaching station, means responsive to movement of the nailing die from the heel attaching station to the nail delivering member for moving against the action of the spring the carriage to a position in which its heel receiving unit is moved at least to the heel attaching station, a detent which is movable to an active position as the carriage moves with the nailing die toward the nail delivering member and is adapted to be engaged by the carriage by the action of the spring as the nailing die moves back to its heel attaching station whereby to locate the carriage with its heel receiving unit at the heel attaching station, and means for moving the detent at a predetermined time to cause the carriage to move by the action of said spring against the stop to a position in which its toplift receiving unit is at the heel attaching station.

5. In a heel attaching machine, a carrier, a nailing die which is interchangeably mounted on the carrier and has a plurality of passages, a pair of posts arranged at opposite sides of the nailing die and depending from the carrier, a housing slidingly mounted for vertical movement upon the posts, a primary driver head mounted on the housing, stops secured to the posts, spring-pressed plungers slidingly mounted in the posts and adapted to bear against the slidable housing to urge said housing against said stops, said housing having guideways, a plunger mounted for movement along said guideways, a second driver head secured to the plunger, and a detent for retaining the plunger in a predetermined idle position in the housing.

6. In a heel attaching machine, primary and secondary sets of nail drivers, primary and secondary thrust members for operating respectively the primary and secondary sets of drivers in one direction, a normally fixed stop which is movable into different initially adjusted positions, a pair of switches which comprise plungers and are movable into different adjusted positions with the stop, fluid pressure means, control means for causing said fluid pressure means to move the primary thrust member in one direction to a predetermined position against the stop, a striker which is carried by the primary thrust member and is adapted to operate the plunger of one of the switches when said primary thrust member is in engagement with the stop whereby to cause said fluid pressure means to hold said primary thrust member against the stop and to cause the secondary thrust member to be moved in said one direction to a stop position against the primary thrust member, means for causing the drivers and the thrust members to be moved in a direction opposite to said one direction, and a striker carried by the secondary thrust member and adapted to operate the plunger of the other switch as said secondary thrust member comes to rest to cause the fluid pressure means to allow said last-named means to be rendered effective.

7. In a heel attaching machine, primary and secondary sets of nail drivers, primary and secondary thrust members for operating respectively the primary and secondary sets of drivers in one direction, a normally fixed stop which is movable into different initially adjusted positions, a pair of switches which comprise plungers and are movable into different adjusted positions with the stop, fluid pressure means, control means for causing said fluid pressure means to move the primary thrust member in one direction to a predetermined position against the stop, a striker which is carried by the primary thrust member and is adapted to operate the plunger of one of the switches when said primary thrust member is in engagement with the stop whereby to cause said fluid pressure means to hold said primary thrust member against the stop and to cause the secondary thrust member to be moved to a stop position against the primary thrust member, means for causing the drivers and the thrust members to be moved in a direction opposite to said one direction, a striker carried by the secondary thrust member and adapted to operate the plunger of the other switch as said secondary thrust member comes to rest to cause the fluid pressure means to allow said last-named means to be rendered effective to cause said primary and secondary thrust members to reverse their movement and to return to their starting positions, and control means for rendering said one switch inactive whereby to insure against movement of the secondary thrust member in said one direction and to allow said last-named means to be rendered effective as soon as the primary thrust member engages said stop.

8. In a heel attaching machine, a primary driver head, a secondary driver head, sets of drivers secured respectively to the primary and secondary driver heads, a primary plunger for operating the primary driver head, a secondary plunger for operating the secondary driver head, fluid pressure means for operating the primary and secondary plungers, a first control means for causing the fluid pressure means to operate the primary plunger whereby to operate the primary driver head, a fixed stop adapted to be engaged by the primary plunger for limiting driving movement of the primary plunger, a second control means operated in response to engagement of the primary plunger with the stop for causing the fluid pressure means to operate the secondary plunger and accordingly the secondary driver head and its associated set of drivers, a stop on the primary plunger, said secondary plunger being adapted to engage said last-named stop to limit movement of said secondary plunger and accordingly the secondary driver head and its associated set of drivers, a third control means operative in response to the engagement of the second plunger with the stop on the primary plunger for causing said fluid pressure means to move said primary and secondary plungers back to their starting positions.

9. In a heel attaching machine, primary and secondary sets of drivers, a fixed stop, means for initially adjusting the stop into different operating positions, fluid pressure means for moving the primary drivers a predetermined

distance in one direction determined by the stop, control means movable into different adjustable positions with the stop, an abutment positioned in accordance with the positions of the primary set of drivers, a member movable in response to movement of the primary drivers for operating said control means to render said fluid pressure means active to cause said primary set of drivers to be held in the work and to cause said secondary set of drivers to be moved in said one direction a distance determined by said abutment whereby to limit movement of said secondary drivers, and means responsive to movement of said secondary set of drivers for operating said control means to render said fluid pressure means active to return the first and second sets of drivers to starting positions.

10. In a heel attaching machine, a jack for a shoe, a nailing die positioned opposite the jack, a nail loader, fluid pressure means for moving the nailing die between a heel attaching station opposite the jack and a nail receiving station opposite the nail loader, and means operative in timed relation with the nailing die for supplying nails to the nail loader for delivery to the nailing die when it is positioned opposite said loader.

11. In a heel attaching machine, means for forcing together during two successive stages of a cycle of the machine a shoe and a heel on the one hand and an attached heel of the shoe and a toplift on the other hand, means for driving in succession two sets of nails into the heel and the heel seat of the shoe during the first stage of the cycle of the machine whereby to attach the heel to the shoe, and means for rendering said last-named means inactive during the second stage of said cycle.

12. In a heel attaching machine, means for forcing together during two successive stages of a cycle of the machine a shoe and a heel on the one hand and an attached heel of the shoe and a toplift on the other hand, fluid pressure means for driving in succession two sets of nails into the heel and the heel seat of the shoe during the first stage of the cycle of the machine whereby to attach the heel to the shoe, and means for rendering said fluid pressure means inactive during the second stage of said cycle.

13. In a heel attaching machine, a jack for a shoe, a nailing die, a carriage for a heel and a toplift, means for moving the carriage to position, during two successive stages of a cycle of a machine, the heel and the toplift respectively over the nailing die, means for moving the jack toward the nailing die during two successive stages of the cycle to force the heel seat of the shoe against the heel on the one hand and the attached heel of the shoe against the toplift on the other hand, means for driving in succession two sets of nails into the heel and the heel seat of the shoe during the first stage of each cycle to attach the heel to the shoe, and means for rendering said driving means inactive during said second stage of each cycle.

14. In a machine for attaching a heel to a shoe and for spanking a toplift onto the heel in two successive stages respectively of a cycle of the machine, a nailing die having passages, a carriage which is adapted to receive and position a heel and a toplift, a jack for a shoe, means for retaining the carriage in a position in which the heel clamped thereto is arranged over the nailing die and beneath the jack, means for moving the jack toward the nailing die to force the heel seat of the shoe against the heel, two sets of drivers reciprocable in the passages of the nailing die, means for operating the sets of drivers successively to drive two sets of nails into the heel and the heel seat of the shoe with the nails left projecting from a toplift receiving face of the heel, means for moving the jack away from the nailing die after the nails have been driven, means responsive to completion of the first stage of said cycle for releasing the carriage for movement to a position in which the toplift is arranged beneath the attached heel of the shoe on the jack, means for moving the jack toward the nailing die to force nails projecting from the heel of the shoe into the top lift and for rendering the nail drivers inactive during the second stage of the cycle of the machine in which the nails left projecting beyond the attaching face of the shoe are forced against the top lift to cause said toplift to be spanked onto the heel.

15. In a machine for attaching during a first stage of its cycle a heel to a shoe and for spanking during a second stage of its cycle a toplift onto the attached heel, fluid pressure means for squeezing the heel and the heel seat of the shoe together with relatively heavy pressure during said first stage, fluid pressure means for squeezing the attached heel and the toplift together with relatively light pressure during said second stage, means for automatically rendering said first-named pressure means active and the second-named pressure means inactive during the first stage of said cycle and for automatically rendering said first-named fluid pressure means inactive and the second-named fluid pressure means active during the second stage of said cycle, fluid pressure means for inserting two sets of nails successively into the heel seat of the shoe and the heel during said first stage, and means for rendering said last-named means inactive during the second stage of said cycle.

16. In a heel attaching machine, supports for receiving a heel and a shoe, fluid pressure means comprising an actuator operatively connected to one of the supports, a first valve, a manually actuated member, means responsive to movement of said member to one recognizable position for operating said valve to cause said actuator to move said one support whereby to force the heel and a heel seat of the shoe together with preliminary pressure, fluid pressure means for inserting in succession two sets of nails into the heel and the heel seat of the shoe to attach the heel to the shoe, second and third valves, means responsive to movement of said member to a second recognizable position for operating said second and third valves to cause said first-named fluid pressure means to move said one support whereby to force the heel and the heel seat of the shoe together with augmented pressure and to cause said second-named fluid pressure means to drive the first set of nails into the heel and the heel seat of the shoe, and means responsive to the driving of the first set of nails into the heel and the heel seat of the shoe for operating said third valve to cause said second named fluid pressure means to drive said second set of nails into the heel and the heel seat of the shoe.

17. In a heel attaching machine, a fixed nailing die, first and second sets of nail drivers and a movable jack cooperating with the nailing die, fluid pressure means for successively operating the first and second sets of nail drivers, and means for transmitting reactionary force of each of said sets of nail drivers to the jack to effect its movement.

18. In a machine for operating upon heel portions of shoes, a fixed support, movable work pressing mechanism and two sets of movable nail drivers cooperating with the support, fluid pressure means for moving the work pressing mechanism under primary pressure and for thereafter moving said sets of nail drivers in succession, said fluid pressure means comprising means for moving during the operation of each of the sets of nail drivers the work pressing mechanism by a force additional to said primary force and dependent upon the resistance encountered by the nail drivers, and means responsive to each of the sets of nail drivers to a predetermined position for controlling said fluid pressure means.

19. In a machine for attaching during a first stage of its cycle, a heel to a shoe and for spanking a toplift onto the attached heel during a second stage of its cycle, primary and secondary sets of drivers, means for squeezing the heel and the heel seat of the shoe together with relative heavy pressure and for successively operating said primary and secondary sets of drivers during said first stage, means for squeezing the attached heel and the toplift together with relatively light pressure during said second stage, and means for automatically rendering said

first-named means active and the second-named means inactive during the first stage of said cycle and for automatically rendering said first-named means inactive and the second-named means active during the second stage of said cycle.

20. In a machine for attaching during a first stage of its cycle a heel to a shoe and for spanking a toplift onto the heel during a second stage of said cycle, a support for a shoe, a nailing die, a carriage for the heel and the toplift, means for positioning the heel and the toplift on the carriage over the nailing die during the first and second stages respectively of the cycle of the machine, means for driving successively during the first stage of said cycle two sets of nails into the heel and the heel seat of the shoe with portions of the nails left projecting beyond the toplift receiving face of the heel, and means for moving the support relatively to the nailing die to squeeze during the first and second stages respectively of the cycle the heel seat of the shoe and the heel on the one hand with relatively high pressure and the attached heel and the toplift of the shoe on the other hand with relatively low pressure.

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