

[72] Inventors **Robert F. Pettit**
Reading;
Kenneth C. Haas, Mohnton; Leslie W.
Gibson, Jr., Reading, all of Pa.
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 [73] Assignee **Teledyne, Inc.**
Los Angeles, Calif.

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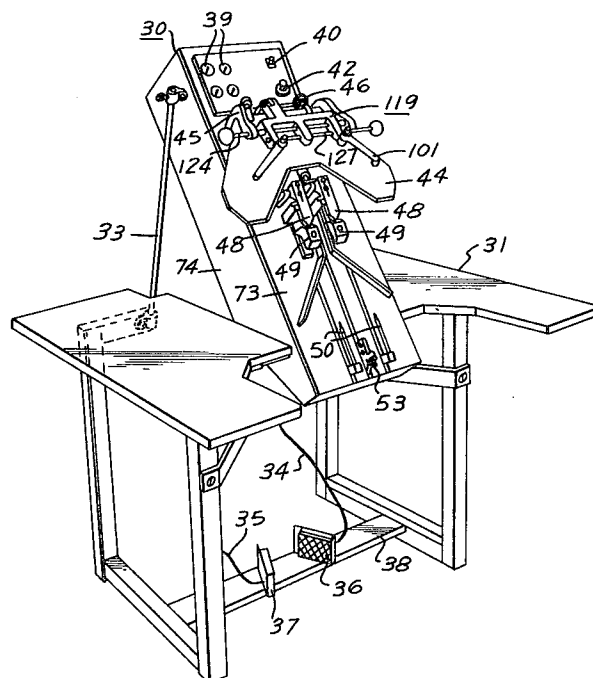
Primary Examiner—Jordan Franklin
Assistant Examiner—George V. Larkin
Attorney—Edelson & Udell

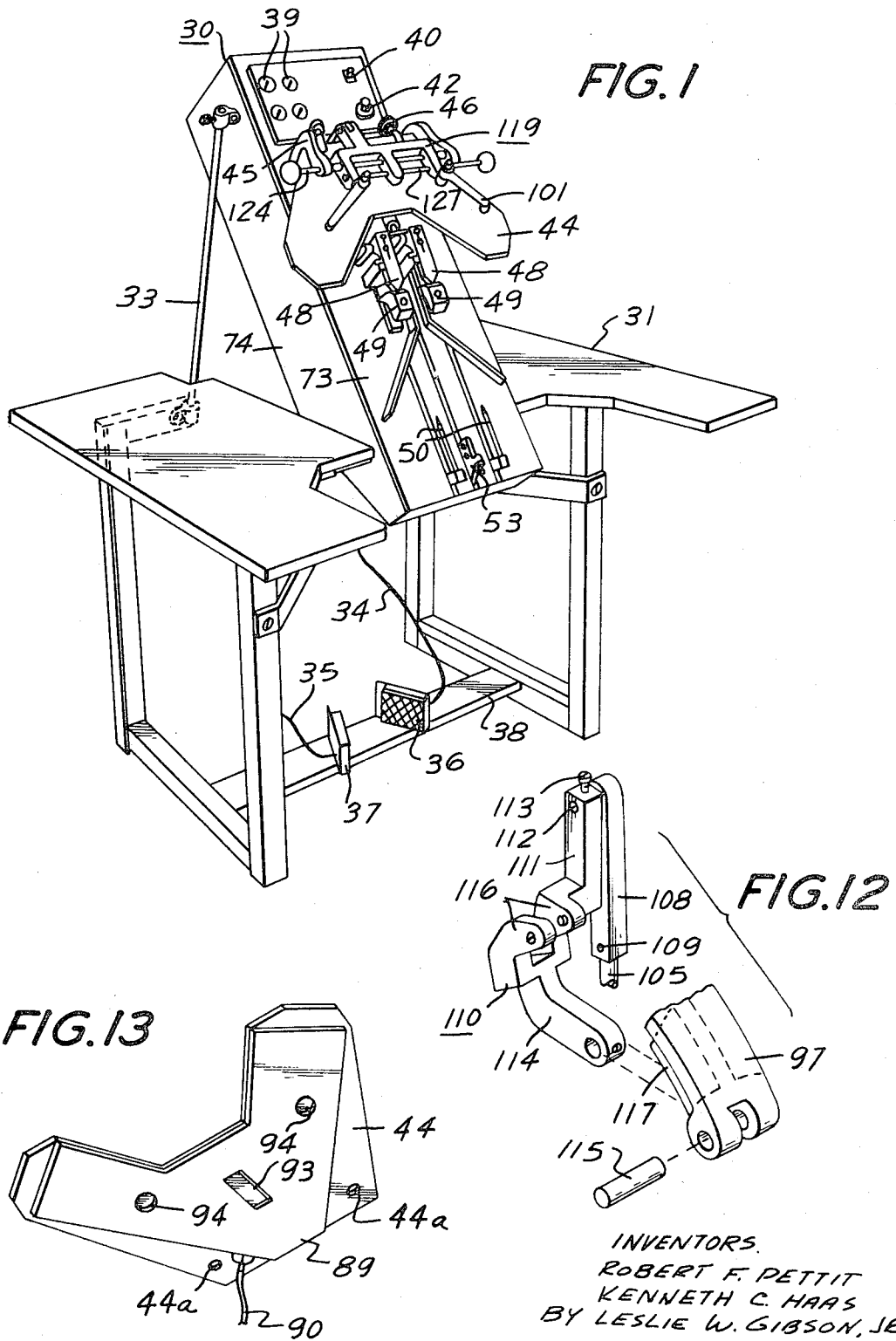
[54] **COLLAR TRIMMING AND PRESSING APPARATUS**
 30 Claims, 18 Drawing Figs.

[52] U.S. Cl. 223/2,
 83/901
 [51] Int. Cl. A41h 43/00,
 A41h 33/00
 [50] Field of Search 223/1, 2,
 38, 37, 61; 83/2, 32, 40, 55, 373, 438, 901

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 2,619,267 11/1952 Voight 223/2

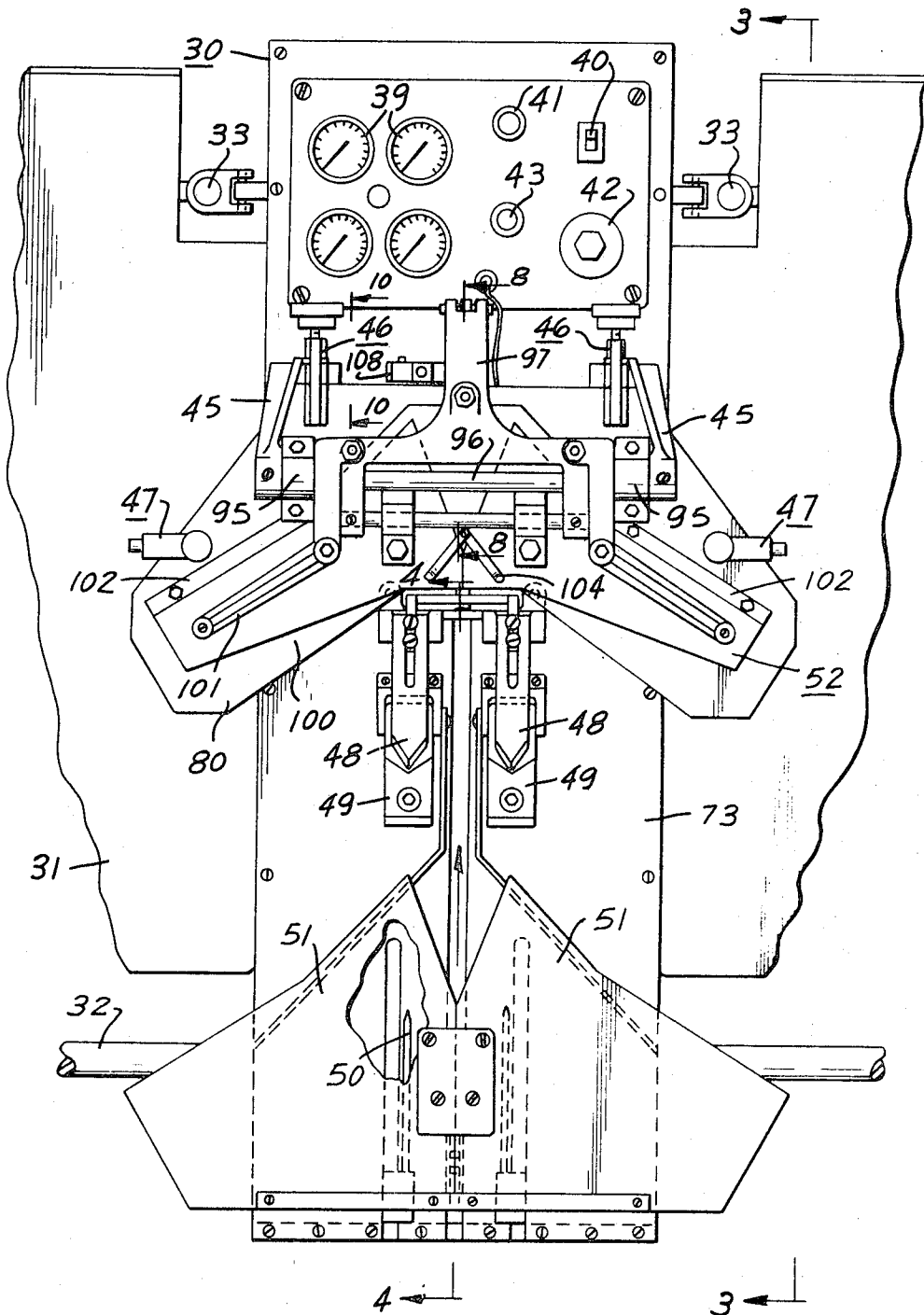
ABSTRACT: A collar-pressing die assembly mounting system and operating control mechanism. The die assembly mounting system includes the operating parts of a pressing die assembly not determined by the shape of the collar to be pressed so that each new die assembly for a differently shaped collar requires only the shaped pressing parts corresponding to the collar shape. Quick-locking indexing clamps and pressing shoes pivot mounts are provided for rapid interchange of pressing dies, and quickly detachable parts of the pressing drive system permit mounting of conventional complete pressing die assemblies. The control system employs two pedals to respectively perform collar trimming and collar pressing by automatically acting power mechanisms which are actuated by the pedals.





INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.

Edelson and Udell
ATTORNEYS.



INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.

Edelson and Udell
ATTORNEYS.

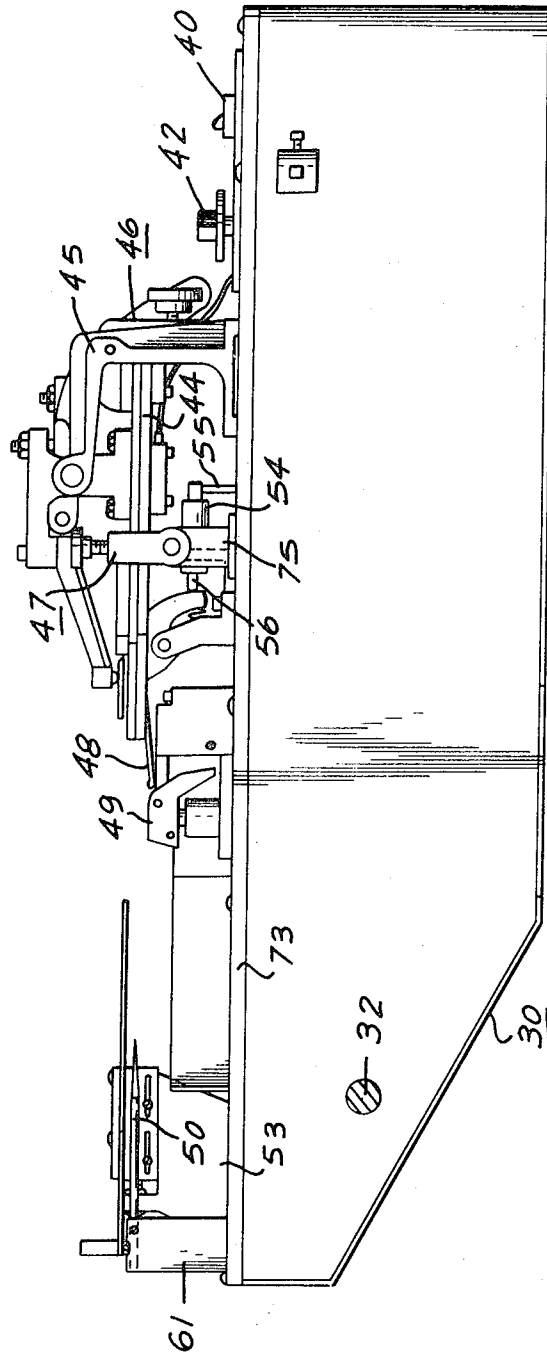
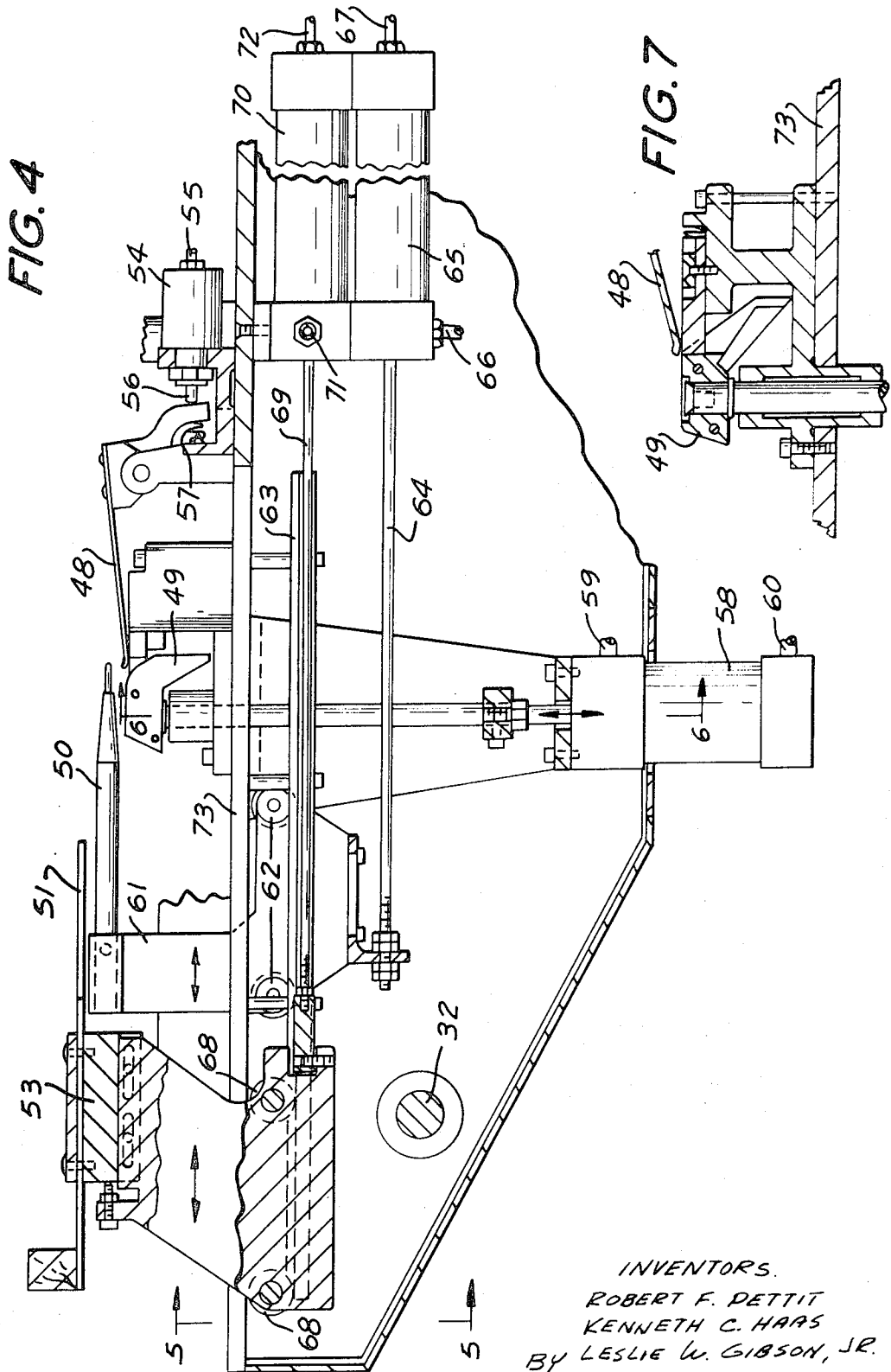


FIG. 3

INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.

Edelson and Udell
ATTORNEYS.



INVENTORS.
 ROBERT F. PETTIT
 KENNETH C. HAAS
 BY LESLIE W. GIBSON, JR.
Edelson and Udell
 ATTORNEYS.

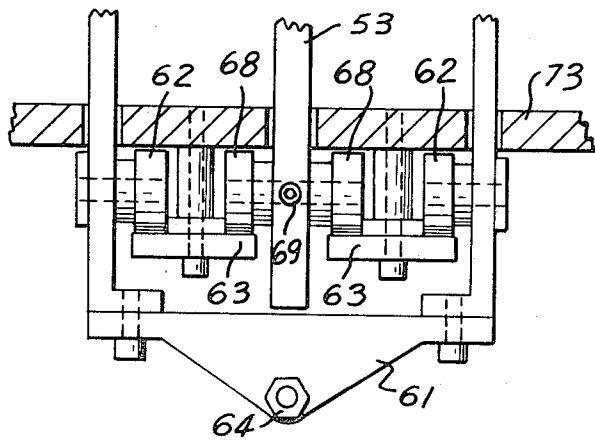


FIG. 5

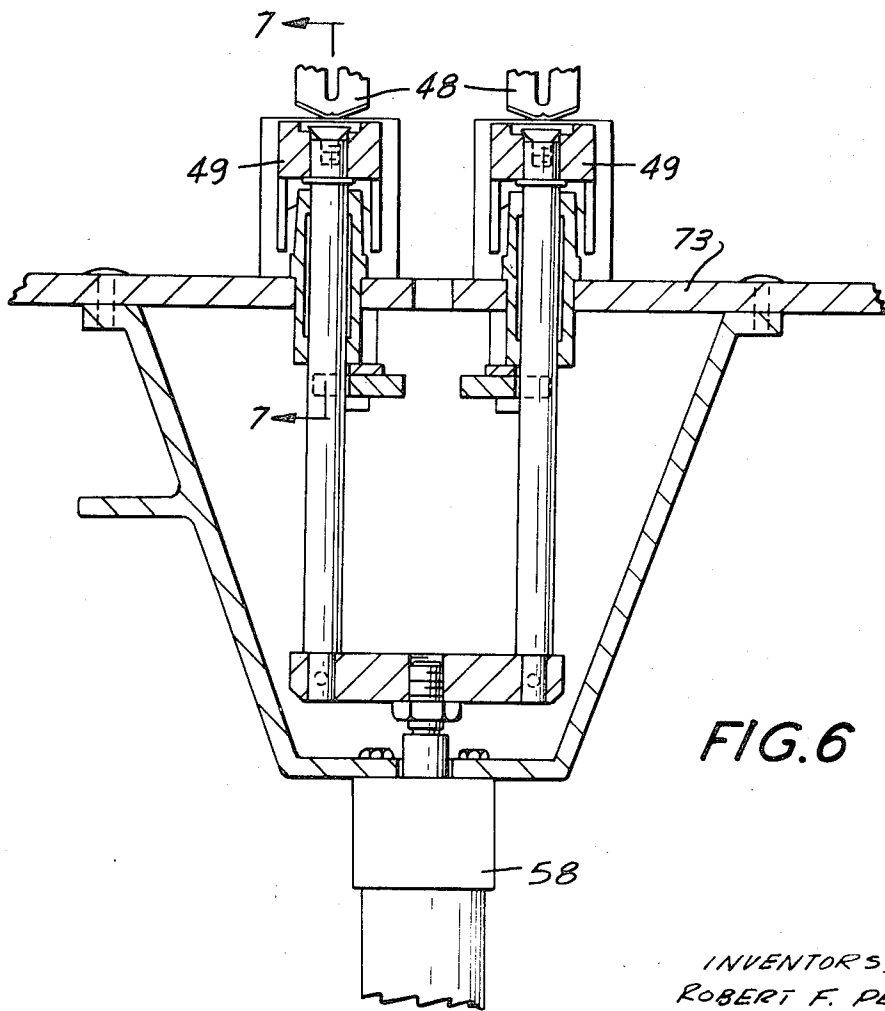
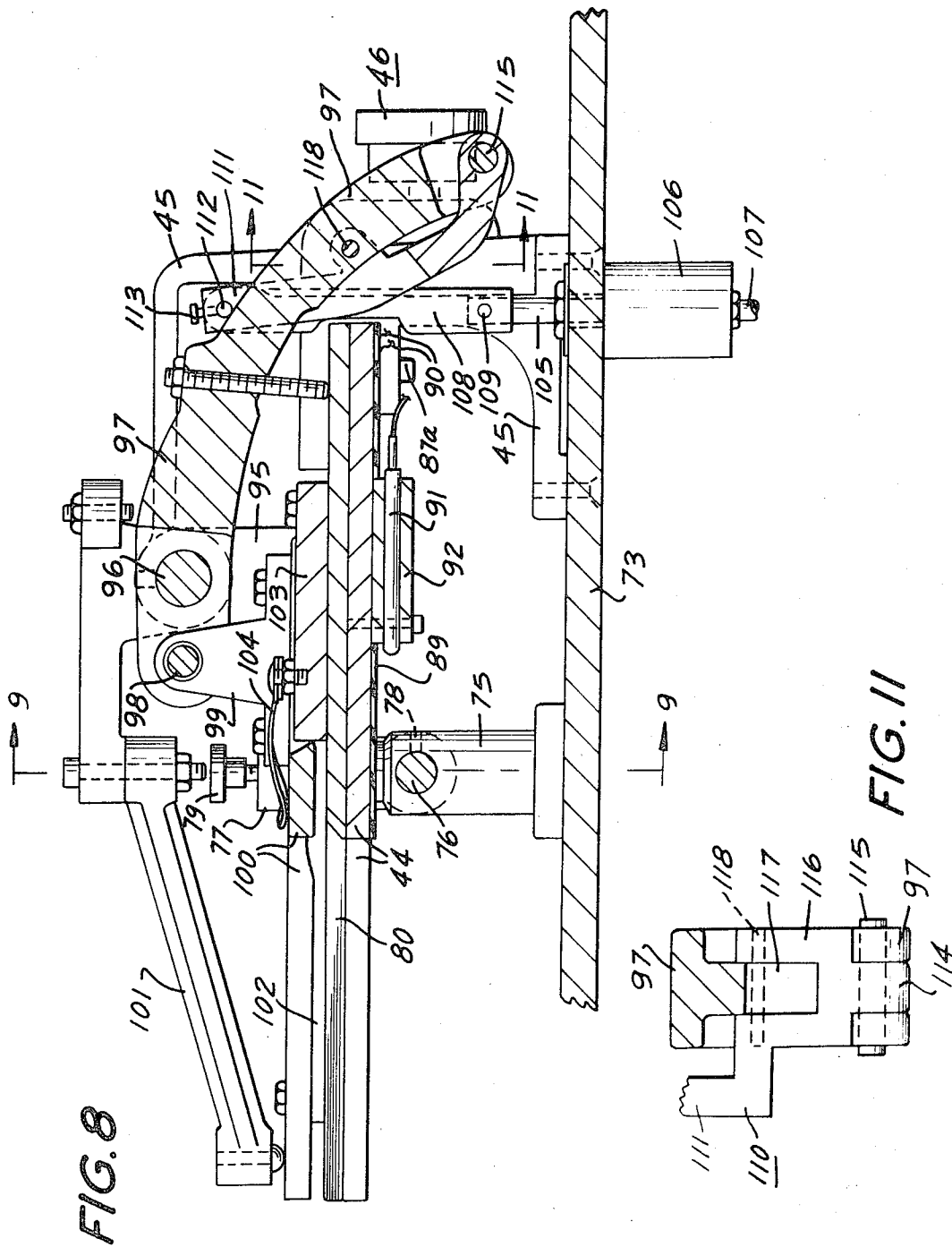
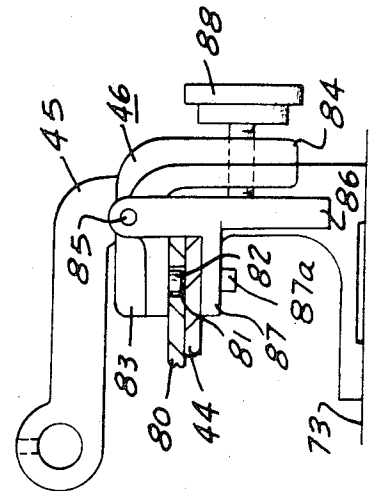
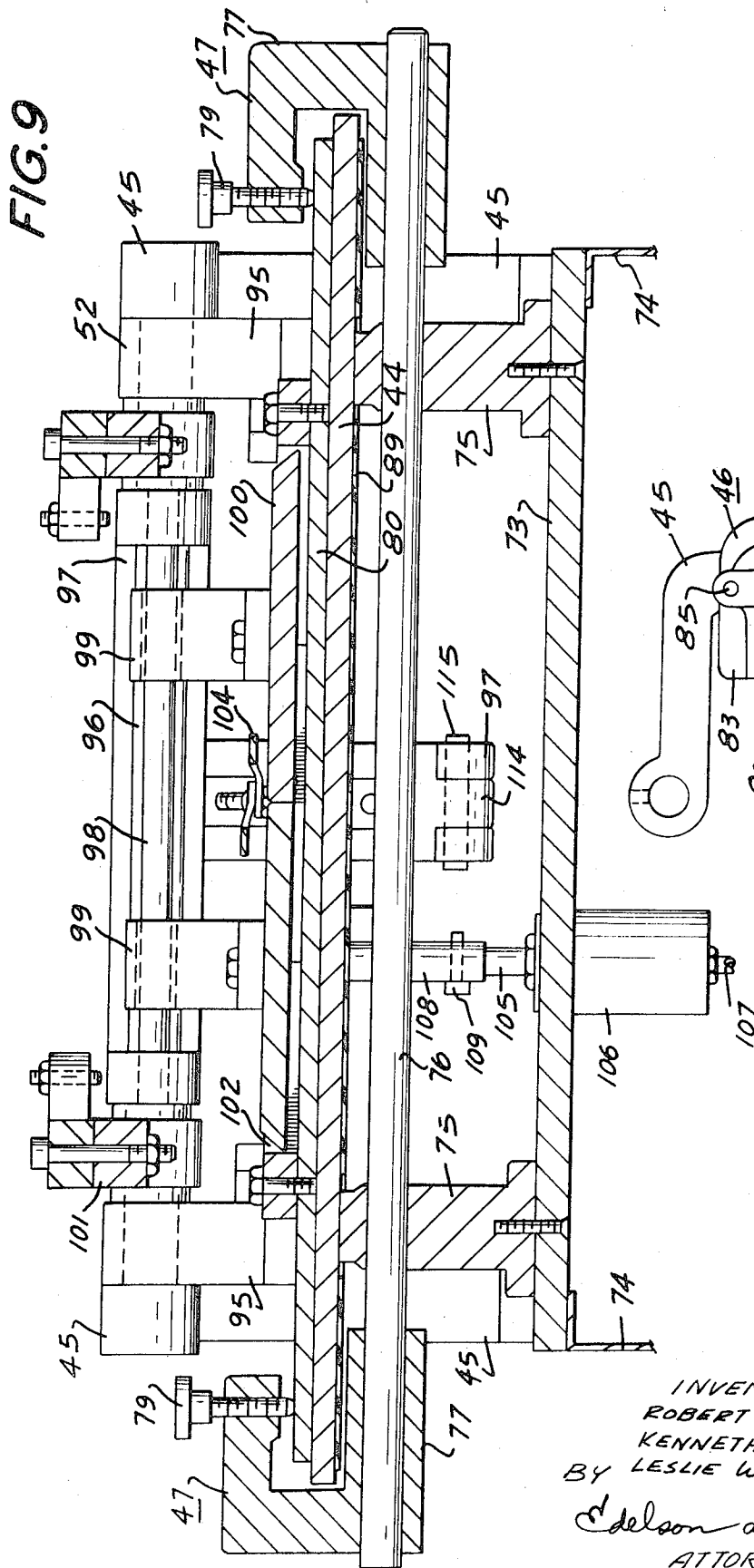


FIG. 6

INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.
Edelson and Udell
ATTORNEYS.





INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.

Edelson and Uell
ATTORNEYS.

FIG. 14

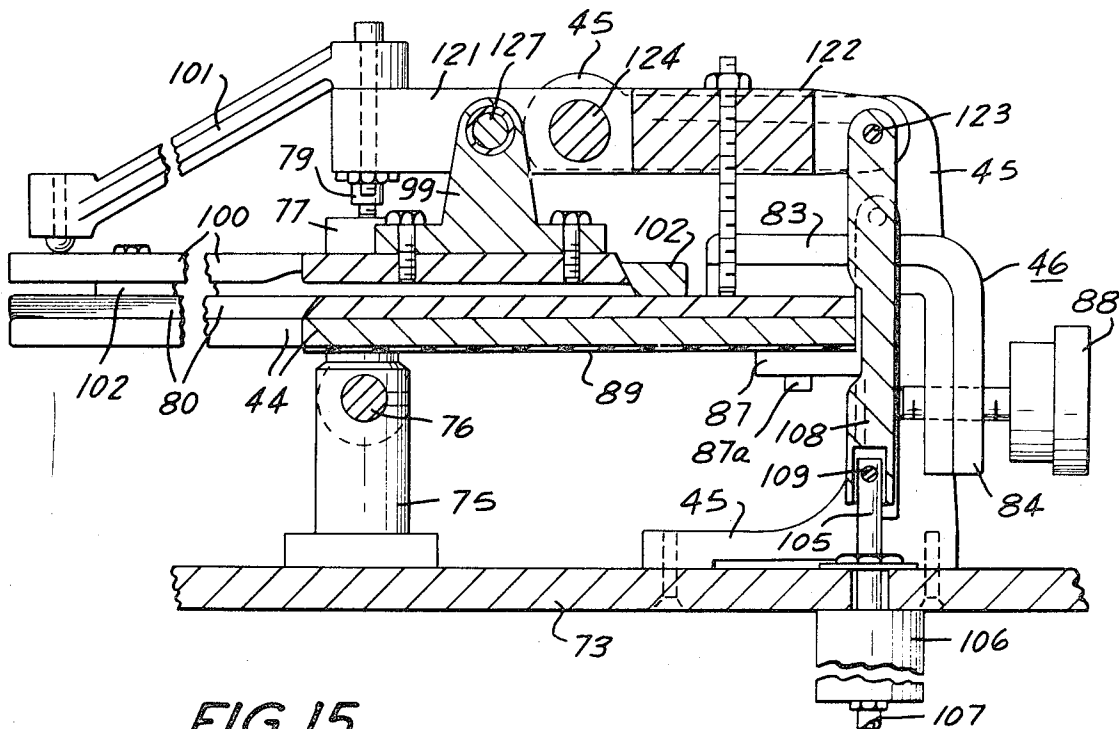
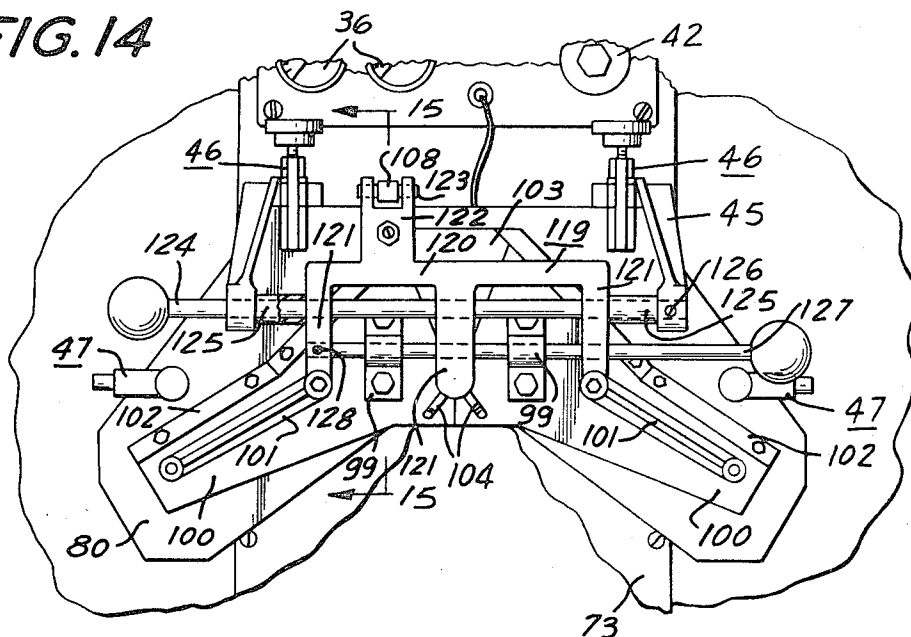
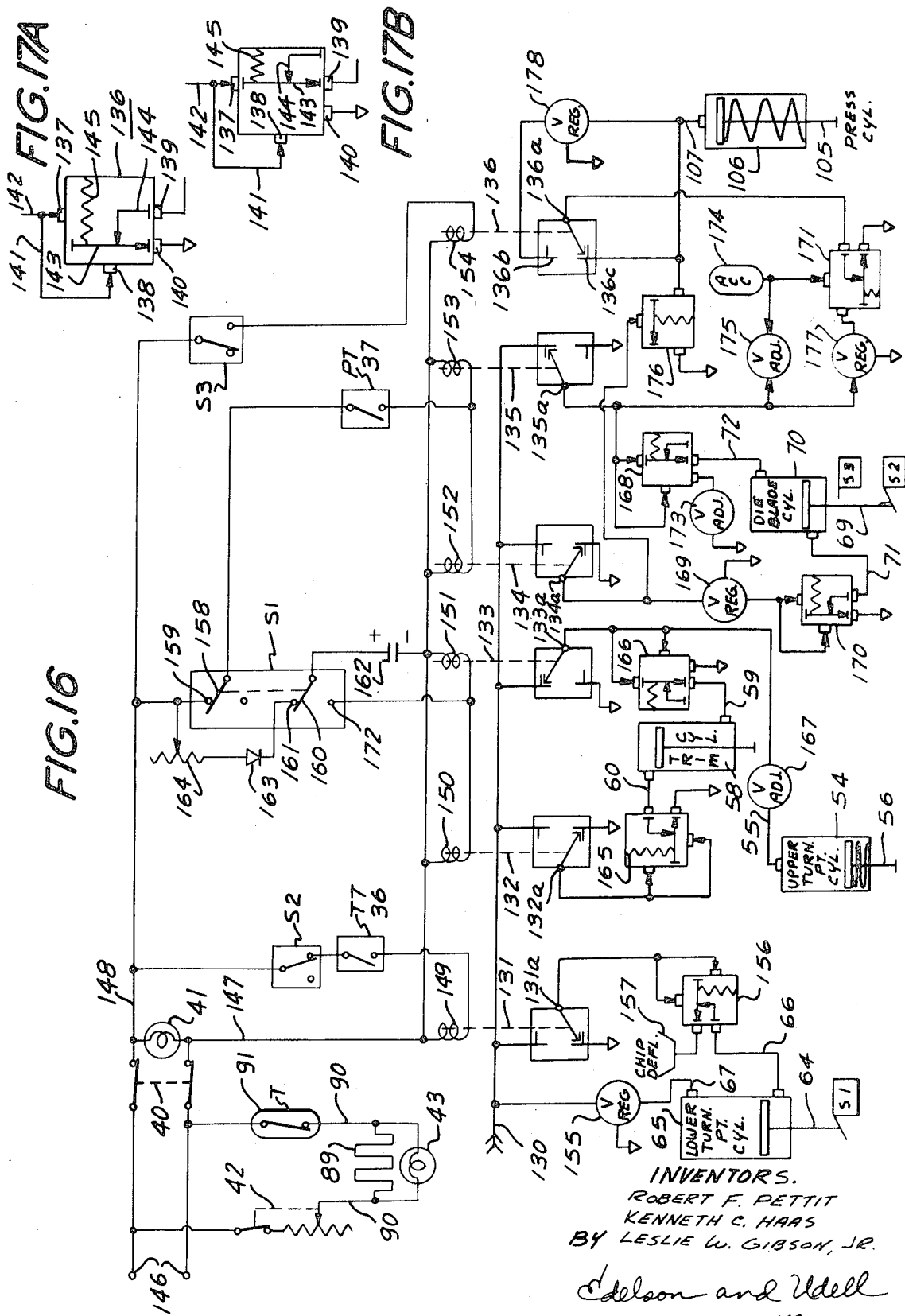


FIG. 15

INVENTORS.
ROBERT F. PETTIT
KENNETH C. HAAS
BY LESLIE W. GIBSON, JR.

Edelson and Udell
ATTORNEYS.



COLLAR TRIMMING AND PRESSING APPARATUS

This invention relates generally to apparatus for trimming and pressing collars, cuffs, lapels and other such multiple-ply parts of garments, and particularly to such apparatus having provisions for automatically trimming excess material from the infolded seam portions of such garment parts preliminarily to the operation of forming and pressing the same to final shape. Such apparatus is shown and described in U.S. Pat. Nos. 2,619,267 and 2,909,307. The present invention relates to improvements in the constructional and operational details of the overall apparatus as well as to improvements in the collar-pressing die assembly itself.

In the past, a separate pressing die assembly for each different type of collar was required to be mounted to the operating apparatus for each different type of collar which it was desired to press, each of these die assemblies including a number of different elements only some of which were associated with the particular shape of the collar to be pressed. The remainder of the parts included various actuating members which were of course required for operability of the die assembly but which were essentially identical from one die assembly to another. Consequently, substantial duplication of parts existed.

A principal feature of the invention is a convertible feature of the die assembly and mounting system which makes possible a great cost reduction in collar-pressing dies by requiring that only the die baseplate with the collar recess-forming members, pressing shoes and die blades need be replaced when a differently shaped collar is to be pressed. This novel construction eliminates the duplication in each new collar-pressing die of the actuating yoke and associated shafts and pillow block mounts, as shown for example in the type of die assembly disclosed in U.S. Pat. No. 2,619,267. Moreover, the novel apparatus according to the invention with which the convertible die assembly is used is so constructed that the old-type die assemblies previously mentioned may also be mounted upon and used with the collar trimming and pressing apparatus so that an accumulated stock of such dies owned by users of the equipment are not rendered obsolete.

Another object of the invention is to provide a novel two-pedal automatic apparatus for carrying out the operations of trimming and pressing of collars, one pedal effecting the trimming operation while the other pedal effects the pressing operation, the pedals controlling automatically operating mechanisms which are self-powered and do not require the application of physical force by the operator in order to carry out the desired operations.

Still another object of this invention is to provide a novel heating mechanism for the collar-pressing die assemblies, which heating mechanism provides a diffused heat contact with the die assembly baseplate for a better controlled and more uniform heating of the pressing die.

A further object of the invention is to provide a novel automatic apparatus for controlling the movements of the collar-pressing die assembly pressing shoes in conjunction with the parts of the apparatus which position a collar to be pressed within the pressing die so that the pressing cycle is precisely and uniformly timed and requires no complicated hand-and-foot coordination on the part of the operator of the apparatus in order to obtain continuously repeatable uniform collar pressing results at an increased rate of production utilizing substantially unskilled labor.

The foregoing and other objects of the invention will become clear from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIG. 1 is a perspective of the entire apparatus according to the invention including the operating housing with its controls mounted into a workstand with the convertible die assembly head operatively mounted for having secured thereto the shaped pressing portions of a die assembly;

FIG. 2 is a plan view of the novel pressing apparatus according to the invention showing mounted thereon a prior art type of collar pressing die assembly and the die blades associated therewith;

FIG. 3 is a side elevation of the apparatus shown in FIG. 2 as would be seen when viewed along the lines 3—3 of FIG. 2;

FIG. 4 is an enlarged longitudinal vertical sectional view through a portion of the apparatus of FIG. 2 as would be seen when viewed along the lines 4—4 of FIG. 2;

FIG. 5 is a vertical cross-sectional view at the front end of the apparatus of FIG. 2 as would be seen when viewed along the lines 5—5 of FIG. 4;

FIG. 6 is a vertical cross-sectional view through the collar point trimming heads as would be seen when viewed along the lines 6—6 of FIG. 4;

FIG. 7 is a longitudinal vertical sectional detail through the collar-trimming head as would be seen when viewed along the lines 7—7 of FIG. 6;

FIG. 8 is a longitudinal central vertical section through the collar-pressing die assembly on an enlarged scale, as would be seen when viewed along the lines 8—8 of FIG. 2;

FIG. 9 is a cross-sectional view through the die assembly of FIG. 8 as would be seen when viewed along the lines 9—9 thereof;

FIG. 10 is an enlarged detail view showing one of the locking mechanisms for clamping the die assembly baseplate to the underlying heating element as would be seen when viewed along the lines 10—10 of FIG. 2;

FIG. 11 is a vertical sectional view taken along the line 11—11 of FIG. 8 showing a portion of an adapter arm which is employed with the prior art type of die assembly;

FIG. 12 is a perspective view of the adapter arm referred to in the description of FIG. 11;

FIG. 13 is a perspective view from below of the novel diffused heat die assembly baseplate heater which forms part of the apparatus;

FIG. 14 is an enlarged plan detail of a fully operative convertible die assembly mounted in the apparatus of FIG. 1 for operation in the same manner as the prior art type of die assembly shown in FIG. 2;

FIG. 15 is an enlarged vertical section through the convertible die assembly as would be seen when viewed along the line 15—15 of FIG. 14;

FIG. 16 is a schematic operating diagram of the entire apparatus shown in FIGS. 1 and 2 energized and operative but prior to actuation of the trimming and pressing controls; and

FIGS. 17A and 17B are explanatory detail diagrams which illustrate the valve convention adopted and used in FIG. 16.

In the several figures like elements are denoted by like reference characters.

The drawings are organized and will be discussed in the following order:

a. FIGS. 1 and 2 disclose the general organization of the apparatus with both the convertible die assembly head and the prior art die assemblies;

b. FIGS. 3 to 7 show the trimming and turning mechanisms which are illustrated for completeness of disclosure but which are not generally new;

c. FIGS. 8 through 13 illustrate a prior art collar pressing die assembly operatively mounted to the new apparatus according to the invention;

d. FIGS. 14 and 15 show the new convertible die assembly mounted to the apparatus instead of to the prior art type of die assembly;

e. FIGS. 16 and 17 illustrate the novel control system which is part of the apparatus according to the invention.

GENERAL ORGANIZATION

Considering first the general organization shown in FIGS. 1 and 2, there is seen the novel trimming and pressing apparatus according to the invention, designated generally as 30, pivotally supported near its lower end to a worktable 31 by a crossbar 32, and adjustably supported near its upper end by a pair of support rods 33 adjustably carried by the table 31 and by means of which the angular inclination of the apparatus 30 may be adjusted. Operatively connected to the apparatus 30 by the respective electrical cables 34 and 35 are a trimming

treadle 36 and pressing treadle 37 both of which may be secured to cross strut 38 of the table 31.

The apparatus 30 is provided with a control panel at its upper end including pneumatic gauges 39 which indicate air pressure at various points in the apparatus, a power on-off switch 40 and associated indicator 41, and a rheostat 42 for controlling the temperature of the die assembly baseplate heater, and indicator lamp 43 to show when the die assembly baseplate is at the desired temperature.

Spaced downward from the control panel is the heater plate 44 which is secured to the apparatus in a manner which will be described in connection with the showing of FIGS. 8 and 9, and a pair of laterally spaced main support arms 45 which carry the operating yoke of the convertible die assembly or which bracket and position the operating yoke assembly of the known types of die assembly. Additionally shown are rear clamps 46 and side clamps 47 which clamp the baseplate of a collar-pressing die assembly into broad surface contact with the heater plate 44 to thereby heat the die assembly, regardless of whether the baseplate is that of a convertible die according to the invention or of a prior art type of die assembly.

Spaced just downward from the heater plate 44 are the upper turning points 48 upon which the inside-out collar is first placed for trimming of the excess material at the collar points, the trimming being carried out in conjunction with the trimmer heads 49 spaced immediately downward from the upper turning points 48. Spaced downward toward the bottom end of the apparatus are the lower turning points 50 which are shiftable rectilinearly together upward into apposition with the points of the upper turning points 48 after a trimming operation has been carried out so that the trimmed collar may be then retracted and slipped onto the die blades 51 for subsequent movement thereon upward into the pressing die assembly 52 as for example shown in FIG. 2, the die blades 51 being secured to and carried by a die blade carriage 53 best seen in FIG. 1.

TRIMMING AND TURNING MECHANISMS

Consider now FIGS. 3 through 7 which show the trimming and turning mechanism and the pneumatic drive cylinders coupled to these mechanisms for controlled actuation thereof. The upper turning points 48 are shown in a depressed or down position which only occurs when the apparatus is either deenergized or during a trimming operation. Normally the upper turning points 48 are in a raised position in which the points are substantially in horizontal alignment with the lower turning points 50, and thus being in position to have a collar point slipped thereover just prior to trimming, and also just after trimming so that the collar point is properly positioned to be reversely turned backward off of the upper turning point 48 and onto the associated lower turning point 50 which is then in apposition therewith.

The up-and-down positioning of the upper turning points 48 is controlled by an upper turning point cylinder 54 normally subjected to compressed air through pneumatic line 55 so that the cylinder plunger 56 is normally extended to overcome the bias of spring 57 and cause the upper turning points 48 to be in their raised position. During a trimming operation, the cylinder 54 is momentarily deenergized so that the upper turning point 48 is dropped to the lower position as shown and a trimming operation is carried out by a rapid upward and downward movement of the trimming heads 49 caused by a momentary pressure reversal condition in the trimming head cylinder 58 effected through the pneumatic lines 59 and 60.

The lower turning points 50 are mounted on a carriage 61 fitted with wheels 62 which are seated upon and ride along a pair of tracks 63, the carriage 61 being fixedly secured to and shiftable with a drive shaft 64 secured to the shiftable plunger of pneumatic cylinder 65 fitted with pneumatic lines 66 and 67 for effecting the movement of the cylinder plunger.

Similarly, the carriage 53 to which the die blades 51 are secured is fitted with wheels 68 seated upon and rectilinearly shiftable along the tracks 63. The carriage is secured to a drive shaft 69 which is in turn connected to the plunger of a pneumatic cylinder 70 fitted with pneumatic lines 71 and 72 for effecting bidirectional shifting of the die blade carriage 53 along the tracks 63 from a retracted position shown in FIGS. 1 and 2 to an upwardly shifted position in which the die blades carry the collar to be pressed into the pressing recess of the die assembly. The timing of the movements of the turning points, trimming heads and die blade carriage, as well as the pressing operation will be described hereinafter subsequent to the description of the collar-pressing die assemblies and their securement to the trimming and pressing apparatus.

DIE ASSEMBLY ORGANIZATION AND MOUNTING

Referring now to FIGS. 2 and 8 through 13, and principally to FIGS. 2, 8 and 9, it is observed that the apparatus 30 is provided with a top baseplate 73 secured to the housing sidewalls 74 of the apparatus 30. The die assembly supports are secured to the baseplate 73 as are all of the mechanisms previously described in connection with FIGS. 3 through 7. Secured to and extending upward from the baseplate 73 are a pair of laterally spaced posts 75 having flat coplanar upper surfaces upon which are seated the under surface of heater plate 44.

Extending transversely through each of the posts 75 is a shaft 76 upon the opposite ends of which are slidably fitted C-shaped elements 77 of the side clamps 47, the shaft 76 being locked to each of the posts 75 by means of setscrews 78 as best seen in the showing of FIG. 8. Threaded vertically downward through the upper horizontal arms of the C-shaped elements 77 are locking bolts 79 which fixedly clamp the baseplate 80 of the die assembly 52 flatwise down upon the upper surface of the heater plate 44, thereby locking the die assembly to the posts 75 and consequently to the baseplate 73 of the apparatus 30.

The die assembly baseplate 80 is also clamped to the heater plate 44 along the rear edges of these elements by the rear clamps 46 in the manner best shown in the detail of FIG. 10 to which reference should now be made. The rear margin of the die assembly baseplate 80 is provided with a pair of apertures 81 within each of which is disposable a stud 82 extending downward from the under surface of the horizontally disposed arm 83 of a pair of L-shaped members which each also have a vertically extending arm 84, the arm 83 being pivotally connected as at 85 to the upper end of a vertically depending formation 86 which is integral with the main support arm 45. A horizontally extending shelf 87 which underlies the lower surface of heater plate 44 is also integral with the main support arm 45.

Threaded through the vertical arm 84 of the L-member is a wheeled locking bolt 88 which engages the rear surface of the vertical formation 86. When the wheeled locking bolt 88 is rotated clockwise it draws vertical arm 84 outward toward the wheel and away from vertical formation 86, thereby rotating horizontal arm 83 counterclockwise about the pivot 85 and compressing the heater plate 44 and die assembly baseplate 80 between the arm and horizontal shelf 87 to thereby clamp the same together. The pivot 85 is set into and carried by the main support arm 45 so that the rear clamps 46 are fixedly located. The stud 82 properly indexes the baseplate of the die assembly 52.

As best noted from FIGS. 10 and 13, the rear end of the heater plate 44 is anchored to the horizontal shelves 87 by bolts 87a extending vertically upward through the latter into the threaded holes 44a of the rear marginal edge of the heater plate.

Adhered to the undersurface of the heater plate 44 is a surface heater element 89 to which is connected by leads 90 a thermostatically controlled source of electrical energy, the sensing thermostat 91 being secured against the under surface of the heater plate 44 in good thermal contact therewith by

means of the contact block 92. The surface heater 89 is cut away as at 93, best seen in FIG. 13, to permit direct surface engagement of the contact block 92 with the heater plate 44. Similarly, the heater element 89 is circularly apertured as at 94 for direct mechanical supporting engagement of the upper surface of the support posts 75 with the undersurface of the heater plate 44.

Secured to the baseplate of the die assembly 52 at opposite sides thereof are a pair of large pillow blocks 95 between which extends and within which is journaled a main pivot shaft 96 upon which is rotatably mounted a Y-yoke 97. Extending parallel to the main pivot shaft 96 and forward thereof between the arms of the Y-yoke 97 is a cross-shaft 98 upon which are rotatably journaled a pair of spaced-apart small pillow blocks 99 the lower ends of which are bolted to the upper movable pressing die plates 100. Also secured to the Y-yoke 97 and exerting pressure on the upper pressing plates 100 at the outer extremities thereof are auxiliary pressure arms 101. Completing the die assembly are the collar recess-forming strips 102 and center wedge 103 to the latter of which are secured auxiliary center pressure leaf springs 104.

When the tail end of the Y-yoke 97 is rotated counter-clockwise as viewed in FIG. 8, the upper pressing plates or shoes 100 move downward toward the baseplate 80 to press the collar therebetween. The upward movement of the tail end of the Y-yoke 97 is effected by a vertical movement of the plunger shaft 105 of pneumatic pressing cylinder 106 by means of controlled air pressure applied through pneumatic line 107. Plunger shaft 105 is connected at its upper end to an upwardly extending drive link 108 by means of a pin 109 which permits some fore and aft rocking movement of the drive link 108 with respect to the plunger shaft 105. When the novel convertible pressing head is utilized with the apparatus it is connectable directly to the drive link 108 as will be subsequently seen in connection with the description of FIGS. 14 and 15. However, when the prior art type of pressing die assembly is utilized, such as the die assembly 52 just described, an adapter arm is required which is seen in various aspects as the arm 110 in FIGS. 8, 11 and 12 to which attention should now be directed.

The adapter arm has an upwardly extending vertical leg 111 pivotally coupled to the upper end of the drive link 108 by pivot 112 secured by setscrew 113. The lower end of the adapter arm 110 is formed with a rearwardly extending tail 114 pivotally connected to the lower end of Y-yoke 97 by means of a pin 115. Intermediate between the upper vertical leg 111 and the rear tail 114 of the adapter arm 110 are a pair of rearwardly extending spaced-apart ears 116 which are disposed on opposite sides of the central underweb 117 of the Y-yoke 97 and are transversely pinned thereto by pin 118 as best seen in FIGS. 8 and 11. When the novel convertible head according to the invention is utilized with the trimming and pressing apparatus 30 the adapter arm 110 is not needed and may be dispensed with. The convertible die assembly is illustrated in the showings of FIGS. 1, 14 and 15 to which reference should now be made.

CONVERTIBLE DIE ASSEMBLY

In FIGS. 14 and 15 it will be observed that all of the physical die assembly supporting structure of the apparatus is exactly the same as that which was described in connection with the conventional pressing die 52 shown in FIGS. 8 and 9. Moreover, in order to more readily establish the correspondence between parts in the convertible system and parts in the prior art die assembly 52, it may be considered that the die assembly 52 has been partly dismantled by removing the Y-yoke 97, the large pillow blocks 95, the main pivot shaft 96 and cross-shaft 98. Accordingly, the parts which remain are the baseplate 80, upper pressing shoes 100, collar recess-forming strips 102, center wedge 103 with leaf springs 104, auxiliary pressure arms 101 and small pillow blocks 99.

The baseplate 80 of the die assembly is secured to the supporting apparatus 30 in the manner already described in connection with the die assembly 52 by means of the rear clamps 46 and side clamps 47, and the differences in the die assembly structure are basically involved with the mechanism for driving the pressing shoes 100 downward into pressing position.

The drive mechanism consists of a double pivot pressing yoke 119 having a horizontally extending web 120 from which forwardly extend three laterally spaced-apart arms 121, and from which rearwardly extends a single arm or tail 122 bifurcated at its terminating rear end to form a clevis within which is disposed the upper end of the drive link 108, the drive link being pivotally connected to the clevis by a pin 123. The forwardly extending arms 121 are transversely coaxially bored to close fittingly receive therethrough a ball-ended pivot shaft 124 which is also projected through aligned bores in the forwardly terminating ends of the main support arms 45. A pair of spacer sleeves 125 are positioned on the shaft 124 between the outer arms 121 of the pressing yoke 119 and the main support arms 45 to properly laterally position the yoke 119 for proper operation. The pivot shaft 124 is retained at the proper position by a setscrew 126 in the right-side main support arm 45.

The forward extending arms 121 of the yoke 119 are provided with a second set of coaxial bores parallel to the first set within which is disposed the pivot shaft 124, the second set of bores having projected therethrough a pivot mount ball-headed draw shaft 127 which is securable to the left-hand arm 121 of the yoke 119 by a setscrew 128. As best seen in FIG. 14, the upper pressing shoes 100 are pivotally suspended from the draw shaft 127 by virtue of having the latter projected through the bearings of the small pillow blocks 99 so that the pressing shoes are pivotally suspended from the draw shaft 127. The auxiliary pressure arms 101 are secured to the forward ends of the outer pair of the forward extending yoke arms 121.

Referring back to FIG. 1, it will be observed that the convertible diehead includes as basic components which remain with the apparatus 30 independently of the particular shape of collar which is to be pressed, the heater plate 44, rear clamps 46 and side clamps 47, yoke 119 with auxiliary pressure arms 101, main pivot shaft 124 and pivot mount draw shaft 127. Consequently, the only parts which need to be supplied for pressing different collar shapes are a baseplate 80 with the collar shape pressing recess-forming strips 102 and center wedge 103, leaf springs 104, and the upper pressing shoes 100. Usually, but not necessarily, the small pillow blocks 99 will also be supplied with the upper pressing shoes 100 so that the upper pressing shoes may be quickly and easily secured in position by merely withdrawing the draw shaft 127 from the yoke 119 and reinserting it to pick up the pillow blocks 99. The baseplate assembly carrying all of the recessed strips is of course quickly secured to the apparatus in the aforesaid manner by use of the rear clamps 46 and side clamps 47.

Accordingly, the cost of a collar pressing die assembly is drastically reduced because it is no longer necessary to supply with each such die assembly suitable for pressing a differently shaped collar any of the following component parts which were formerly required with each such die assembly:

- Y-yoke 97;
- Two large pillow blocks 95;
- Two auxiliary pressure arms 101;
- Main pivot shaft 96; and
- Cross-shaft 98.

It should also be appreciated however that the novel construction of the trimming and pressing apparatus 30 including in particular the use of the main support arms 45 results in an apparatus which not only may incorporate the novel convertible die assembly construction, but also permits the use of conventional pressing die assemblies on a nonobsoleting basis so that users having a substantial stock of die assemblies from the past may continue to use the same for the remainder of their useful life while at the same time receiving the advantage of an ap-

paratus for which future purchased die assemblies are of reduced cost.

Understanding now the mechanical structure of the apparatus according to the invention, consider the schematic circuit diagram of FIG. 16 for an understanding of the operating sequence of the apparatus and the manner of automatically precisely carrying out the operations of collar trimming and pressing

OPERATING CONTROL SYSTEM

Considering now the schematic diagram of FIG. 16 it will be observed that all of the pneumatic operating cylinders previously identified are shown in FIG. 16 together with their controls and interconnections by means of which the various operations are carried out. An air supply manifold 130 is shown as connected to an input port of each of the solenoid-controlled air valves 131 through 135, and an additional solenoid air valve 136 is also shown although it is not connected to the manifold 130. The collar trimming and turning functions are carried out under control of the air valves 131, 132, and 133, while the collar-pressing functions are carried out by the air valves 134, 135 and 136.

The various control functions are carried out by the switches S1, S2 and S3 which are shown at two places in the schematic diagram. At the bottom of the diagram, switch S1 is shown as being physically actuated by drive shaft 64 of lower turning point cylinder 65, while in the upper central part of the schematic switch S1 is shown with respect to its actual electrical connections in the electric portion of the control system. Similarly, switches S2 and S3 are shown at the bottom of the diagram in association with drive shaft 69 of die blade cylinder 70, while the electrical circuit connections of switches S2 and S3 are shown in the upper electrical portion of the diagram. The remainder of the pneumatic diagram which occupies the lower portion of the schematic includes regulating valves, adjustable control valves and a number of valves of the type shown in FIGS. 17A and 17B to which attention should be temporarily turned for an understanding of the operation of these valves and the symbology associated therewith.

Referring first to FIG. 17A it is observed that the valve designated generally as 136 has an inlet port 137, a control port 138, and outlet port 139 and an exhaust port 140. The inlet and control ports 137 and 138 are coupled together by a pneumatic line 141 and to an air inlet supply through a pneumatic line 142. The outlet port 139 is coupled to some pneumatic point in the circuit to be controlled while the exhaust port 140 is open to the atmosphere. Within the valve 136 are air passages 143 and 144 which are coupled to one another with the ends of such passages being selectively coupled to ports 137, 139 and 140 under the control of a biasing spring 145 and control port 138.

As shown in FIG. 17A, when there is no air pressure in pneumatic lines 141 and 142 the biasing spring 145 shifts the air passages 143 and 144 to such position that outlet port 139 is connected to exhaust port 140 and any pressure existing at the utility controlled by outlet port 139 is discharged to the atmosphere through this open pneumatic connection. When however air pressure appears in pneumatic lines 141 and 142, this air pressure exists at inlet port 137 and control port 138. The high pressure injected at port 138 overcomes the effect of biasing spring 145 and drives the air passages 143 and 144 to the right as shown in FIG. 17B so that the pneumatic connection between outlet port 139 and exhaust port 140 is blocked, and a through connection from inlet port 137 to outlet port 139 is established through air passage 143. Consequently, the high pressure in line 142 is transmitted through the valve to outlet port 139 and to the device which the valve controls. Of course, when the air pressure is removed from pneumatic lines 141 and 142, the biasing spring 145 again shifts the air passages 143 and 144 to the left to reestablish the conditions already described in connection with the diagram of FIG. 17B.

17A. The control port 138 is shown for ease of understanding, but it is to be understood that there are commercially available valves which have no external control port but which effect the same function by internal valve body passages connected to the inlet port 137.

Returning now to FIG. 16 it is observed that each of the solenoid-controlled air valves 131 through 135, in addition to having an inlet port connected to the air manifold 130 has an exhaust port connected to the ambient atmosphere, and a controlled outlet port 131a through 135a. The valve 136 because of its connections is most suitably described as having a movable controlled port 136a and outlet ports 136b and 136c.

When switch 42 is closed electrical energy from a source of power to which the input terminals 146 are connected is applied to heater 89 of heater plate 44 through thermostat 91. The heater remains energized as long as the thermostat switch remains closed and this condition is indicated by the lamp 43 connected across the heating element 89. When the predetermined temperature is reached the thermostat 91 opens thus removing energization from the heater, and in the well-known manner, the thermostat 91 cycles between open and closed positions to maintain the desired temperature of heater plate 44.

When main power switch 40 is closed, indicator light 41 is lit and power is supplied to the electrical mains 147 and 148. One end of each of the solenoid coils associated with and which control the air valves 131 through 136 are connected to the electrical main 147 with the other ends of all of these coils being returned to the electrical main 148 through one or more of the switches S1, S2, S3, trim treadle 36 and pressing treadle 37. Examination discloses that none of the solenoid coils 149 through 154 is energized when the trimming treadle 36 and pressing treadle 37 are deactuated as illustrated in FIG. 16. Thus, with the power turned on in the apparatus and neither of the trimming and pressing treadles actuated, the electrical conditions of the circuit are as shown.

Similarly, with air pressure on the order of 80 to 100 p.s.i. applied to the air manifold 130, the pneumatic circuit conditions are also as illustrated and are as follows. Air of reduced pressure is applied through pressure-regulating valve 155 and pneumatic line 67 to the upper port of lower turning point cylinder 65. Since the lower port of cylinder 65 is connected through line 66 and the outlet and exhaust ports of valve 156 to the atmosphere through a chip deflector 157, the piston of the cylinder 65 is moved downward to extend the drive shaft 64 and retract the lower turning points as previously described in connection with the showing of FIG. 3. In this retracted position, the piston shaft 64 moves switch S1 poles 158 into engagement with contact 159 to thereby connect the pole of pressing treadle switch 37 to the electrical main 148. Similarly, switch S1 pole 160 is engaged with contact 161 to thereby charge capacitor 162 from the electrical mains 147 and 148 through rectifier 163 and time-constant-determining current-limiting resistor 164.

The control port 132a of air valve 132 is connected to the valve exhaust port and has accordingly caused valve 165 to exhaust the upper port of trim cylinder 58 to the atmosphere. Controlled port 133a of air valve 133 is however connected to the high-pressure manifold 130 to thereby pressurize the inlet and control ports of valve 166 and cause the high-pressure air to be transmitted through the valve to the lower port of trim cylinder 58 and thereby drive the trimming cutters to their down position as shown in FIG. 4. The high-pressure air is also applied through adjustable valve 167 to upper turning point cylinder 54 to extend the cylinder piston 56 and elevate the upper turning points to receive the collar point to be trimmed.

Controlled port 135a of air valve 135 is connected to the high-pressure manifold and actuates valve 168 to pressurize pneumatic line 72 and move the shaft 69 connected to the piston of die blade cylinder 70 to its extended position corresponding to retraction of the die blade carriage to the position as seen in FIG. 2. Since the controlled port 134a of air valve 134 is connected to the valve exhaust port there is no air

pressure passed through pressure regulating valve 169 to control valve 170, and the lower port of die blade cylinder 70 therefore exhausted to the atmosphere through pneumatic line 71. The extension of shaft 69 closes switch S2 to thereby enable trimming treadle 36 to activate the trimming operation when it is actuated. As will be subsequently seen, movement of the die blade to carry out a pressing operation initially opens switch S2 and thereby prevents a trimming operation from being initiated while the pressing cycle is active.

Finally, the inlet port of pressing cylinder 106 is connected through outlet port 136c and controlled port 136a of air valve 136 to atmosphere through the outlet and exhaust ports of control valve 171. The pressing cylinder plunger shaft 105 is therefore retracted to pull down the tail of the Y-yoke 97 or yoke 119 and thereby raise the die assembly pressing shoes 100. With electrical power and air pressure applied to the apparatus the initial conditions are in summary, that the lower turning points and the die blades are retracted to their downward positions, the upper turning points are elevated and the trimming heads are lowered, and the die assembly pressing shoes are elevated.

TRIMMING CYCLE

When now the trimming treadle switch 36 is closed, solenoid coil 149 is energized to thereby connect the control port 131a of air valve 131 to the manifold 130 and apply pressurized air to the inlet and control ports of control valve 156 to shift the internal connections as described in connection with FIGS. 17A and 17B to thereby apply pressurized air through pneumatic line 66 to the lower port of lower turning point cylinder 65. Since the manifold pressure is substantially greater than the pressure applied through pressure-regulating valve 155 to the lower turning point cylinder 65 upper port via pneumatic line 67, the lower turning point piston shaft 64 beings to move into the cylinder 65 which starts the lower turning points moving upward toward the upper turning points.

As soon as this movement starts, the poles 158 and 160 of switch S1 are transferred to thereby open the circuit to the pressing treadle 37 and prevent initiation of a pressing cycle, and connect pole 160 of S1 to contact 172 thereby discharging capacitor 162 through the coils 150 and 151 of solenoid air valves 132 and 133. Energization of the solenoid coils immediately transfers the controlled ports so that controlled port 132a is connected to the high-pressure manifold and controlled port 133a is connected to the exhaust port of valve 133.

The connection of controlled port 133a to atmosphere depressurizes the upper turning point cylinder 54 which immediately drops the upper turning points downward to place the collar points against the trimming base in preparation for a trimming operation. Simultaneously, the lower port of the trim cylinder 58 is also depressurized through control valve 166 while the upper port of trim cylinder 58 is pressurized from pneumatic line 60 through control valve 165 whose inlet and control ports are now connected directly to the high-pressure manifold 130 through air valve 132. The trim cylinder 58 thus drives the trimming heads sharply upward.

During this time interval, the capacitor 162 has dissipated its charge through the solenoid coils and can no longer maintain them energized so that they become deenergized and retransfer the control ports 132a and 133a respectively to the valve 132 exhaust port and to the high-pressure manifold to restore the initial pneumatic circuit conditions. This of course immediately pulls the trimming head downward to trim off the excess collar fabric and cause the upper turning point cylinder to elevate the upper turning points at a rate which is adjustable by means of the adjustable pressure control valve 167 so that the upper turning points are in their elevated position by the time the lower turning points have moved completely upward into apposition therewith. The trimmed collar point is then turned backward off of the upper turning point and onto the

lower turning point in right-side-out condition and ready for pressing.

Release of the trimming treadle 36 by the operator now deenergizes solenoid coil 149 so that controlled port 131a is again connected to the exhaust port of air valve 131, the high air pressure is cut off from control valve 156 and the pressure in the lower turning point cylinder is exhausted through the chip deflector as the lower turning points retract backward toward the die blades. The trimmed collar point is slipped onto the associated die blade as the turning point comes to its retracted rest position, the trimming cycle is completed and a pressing cycle is ready to be initiated. The retraction of the lower turning points of course again transferred the poles of switch S1 so that capacitor 162 is again charged in preparation for the next trimming cycle, and pressing treadle switch 37 is rendered operable by reconnection to the electrical main 148 through now closed pole 158 and contact 159 of switch S1.

PRESSING CYCLE

The pressing operation is initiated by the closure of the pressing treadle switch 37 to energize the solenoid coils 152 and 153 of air valves 134 and 135 to thereby connect the controlled port 134a to the high-pressure air manifold 130 and connect the controlled port 135a to the valve 135 exhaust port. Air pressure is removed from the inlet port of control valve 168 and die blade cylinder 70 upper port is exhausted to the atmosphere through pneumatic line 72 and adjustable valve 173, which latter controls the rate at which the pressurized die blade cylinder 70 exhausts to atmosphere through its upper port, and hence controls the rate of movement of the die blade carriage upward toward the pressing die. High-pressure air is simultaneously injected into the die blade cylinder 70 through the lower port by way of pressure regulating valve 169, control valve 170 and pneumatic line 71.

As soon as the piston of the die blade cylinder 70 starts to move the die blade carriage, piston drive shaft 69 moves away from switch S2 thereby causing it to open and disable the trimming treadle 36 in order to prevent any accidental upward movement of the trimming heads into the path of movement of the die blade carriage. The accumulator 174 discharges back through adjustable valve 175 to atmosphere through controlled port 135a thereby allowing the shiftable air passage of control valve 171 to move upward and interconnect its inlet and outlet ports. Finally, pressurized air from controlled port 134a of air valve 134 is injected at the control port of control valve 176 to shift the internal air passage downward and connect the outlet and exhaust ports of control valve 176 to the port of pressing cylinder 106 to thereby insure that the pressing cylinder is exhausted of air so that the die assembly top pressing shoes 100 are in their up position to permit entry into pressing recess of the die blade carrying the collar to be pressed. Before the die blades enter the pressing recess, piston shaft 69 of die blade cylinder 70 closes switch S3 thereby energizing solenoid coil 154 of air valve 136 and causing the controlled port 136a to transfer and connect to outlet port 136b. The die blade carriage has now come to the end of its travel and the collar to be pressed is properly positioned within the pressing recess of the die assembly.

The pressing treadle 37 is now released by the operator thereby deenergizing solenoid coils 152 and 153 of air valves 134 and 135 so that controlled port 134a is disconnected from the high-pressure manifold 130 and reconnected to the exhaust port of air valve 134, while controlled port 135a disconnects from the exhaust port of air valve 135 and is reconnected to the high-pressure air manifold 130. Since the die blades have not yet retracted, switch S3 is still closed and controlled port 136a of air valve 136 remains connected to outlet port 136b. High-pressure air from the manifold passes through adjustable valve 175 and starts to fill the accumulator 174, which latter acts as a pressure shunt to prevent immediate pressure buildup at the control port of control valve 171 thereby maintaining the inlet and outlet ports of control valve

171 in communication. The high-pressure manifold air passes through pressure-regulating valve 177, control valve 171, solenoid-controlled air valve 136 to pressure-regulating valve 178 where it is reduced to approximately 30 p.s.i. on the outlet side and appears at the inlet port to pressing cylinder 106. The deenergization of solenoid-controlled air valve 134 reconnected the control port of control valve 176 to atmosphere so that the exhaust passage through control valve 176 is blocked off from the pressing cylinder port.

The relatively low-pressure air therefore begins to pressurize the pressing cylinder 106 and causes the cylinder plunger shaft 105 to move part way upward out of the pressing cylinder and partially close the pressing shoes 100 sufficiently to hold the collar within the recess but still allows the die blades to slip out of the collar as the die blade carriage retracts. The die blade carriage of course starts to retract because the retransfer of the controlled ports 134a and 135a again places a low-pressure connection to the atmosphere in communication with the lower port of die blade cylinder 70 while reconnecting the upper port of the die blade cylinder to the high-pressure manifold through control valve 168.

The retracting die blade carriage slips out of the collar which is held within the pressing recess by the partially closed pressing shoes under control of pressing cylinder 106, and as it moves towards its retracted position it opens switch S3 and thereby deenergized the solenoid coil 154 of air valve 136 to cause controlled port 136a to be reconnected to outlet port 136c. The accumulator 174 is still filling and has not yet reached pressure sufficient to actuate control valve 171 so that relatively high-pressure air on the order of approximately 60 p.s.i. coming through pressure regulator valve 178 and fully pressurizes pressing cylinder 106 so that the pressing shoes 100 completely close upon the collar in the pressing recess and thereby press the collar.

When the predetermined pressing time has elapsed, the accumulator 174 is completely pressurized and operates on the control port of control valve 171 to shift the internal air passages to disconnect the outlet port from the pressurized inlet port and connect the outlet port to the exhaust port of air control valve 171 so that the pressing cylinder 106 is quickly depressurized to thereby retract the cylinder plunger shaft 105 and elevate the pressing shoes 100 of the die assembly. The pressed collar is then removed by the operator from the pressing recess. The collar-pressing time interval is controlled by adjustable valve 175 since this determines the length of time required to fill the accumulator 174 to the required pressure level for operating control valve 171. It will be observed that the electrical and pneumatic circuit conditions are now the same as those existing just prior to the initiating of the trimming cycle so that the apparatus is ready for the next complete cycle of operation.

Understanding now the constructional and operational features of our invention it will be appreciated that modifications and variations of our invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of our invention, and it accordingly is intended to claim the same broadly as well as specifically as indicated by the appended claims.

We claim:

1. A collar-pressing die assembly mounting system for use with collar-pressing die assemblies of the type having a baseplate, collar-shape recess-forming elements secured to the baseplate, and collar-pressing shoes movable toward and away from the baseplate to press a collar therebetween, and control apparatus of the type including heating control means to provide for heating a die assembly so mounted and drive means for closing and opening the die assembly pressing shoes, the collar-pressing die assembly mounting system comprising in combination,

a. a pair of laterally spaced-apart main support arms positionally fixedly securable to the control apparatus, said support arms including means for supportively engaging therewith a pivotable drive mechanism which is coupled

or couplable to the die assembly pressing shoes and to the control apparatus drive means for effecting closing and opening movement of the pressing shoes by the drive means, and

b. a plurality of die assembly locking supports having parts fixedly securable to the control apparatus effective to clamp the die assembly baseplate in fixed position relative to the control apparatus.

2. A die assembly mounting system as described in claim 1 wherein at least a portion of said die assembly locking supports includes indexing means effective to positionally index the die assembly baseplate with respect to the control apparatus.

3. A die assembly mounting system as described in claim 1 wherein at least a portion of said die assembly locking supports is coupled to at least one of said main support arms and includes indexing means engageable with and effective to positionally index the die assembly baseplate with respect to the control apparatus.

4. A die assembly mounting system as described in claim 1 further including a heater plate of good thermal conductivity adapted for broad surface thermal transfer engagement with the baseplate of the collar-pressing die assembly, and press means effective to press said heater plate against the baseplate of the die assembly as aforesaid.

5. A die assembly mounting system as described in claim 4 wherein said press means comprises at least a portion of said die assembly locking supports

6. A die assembly mounting system as described in claim 1 further including a heater plate of good thermal conductivity adapted to underlie the baseplate of the collar-pressing die assembly in broad surface thermal transfer engagement therewith, and means operative to lock said heater plate in fixed position relative to the control apparatus.

7. A die assembly mounting system as described in claim 6 wherein said means operative to lock said heater plate in fixed position relative to the control apparatus comprises at least a portion of said die assembly locking supports.

8. A die assembly mounting system as described in claim 1 further including a heater plate of good thermal conductivity adapted to underlie the baseplate of the collar pressing die assembly in broad surface thermal transfer engagement therewith, at least one of said die assembly locking supports comprising a shelf member and an overlying clamping arm of which at least a portion is movable toward and away from said shelf member, said heater plate being seatable upon and securable to said shelf member, and the baseplate of the die assembly being pressable down against said heater plate by said clamping arm.

9. A die assembly mounting system as described in claim 8 wherein said locking support clamping arm carries indexing means effective to positionally index the die assembly baseplate with respect to the control apparatus.

10. A die assembly mounting system as described in claim 8 wherein said die assembly locking support comprising a shelf member and an overlying clamping arm is integral with at least one of said main support arms.

11. A die assembly mounting system as described in claim 8 wherein said plurality of die assembly locking supports comprises, at least two such locking supports each comprising a shelf member and clamping arm as described and being spaced laterally apart to clamp together the outer side margins of said heater plate and die assembly baseplate.

12. A die assembly mounting system as described in claim 8 wherein said plurality of die assembly locking supports comprises, at least two such locking supports each comprising a shelf member and clamping arm as described and being spaced laterally apart to clamp together the outer side margins of said heater plate and die assembly baseplate forward of said main support arms, and at least one such locking support comprising a shelf member and clamping arm as described integral with at least one of said main support arms effective to clamp together the rear margins of said heater plate and die assembly baseplate.

13. A die assembly mounting system as described in claim 1 further including,

- a. a main pivot shaft extending between and removably carried by said main support arms
- b. a double pivot pressing yoke pivotally mounted upon said main pivot shaft, said yoke having a rearwardly extending arm couplable to the control apparatus drive means and also having a forwardly extending formation,
- c. a pivot mount shaft removably carried in parallel relation to said main pivot shaft by said forwardly extending formation of said pressing yoke, and
- d. locking means releasably securing said pivot mount shaft to said pressing yoke forwardly extending formation.

whereby said pressing yoke is quickly pivotally securable to and removable from said main support arms by respectively inserting and removing said main pivot shaft, and different collar-pressing shoes of collar-pressing die assemblies are quickly pivotally attachable to and detachable from said pressing yoke by insertion and withdrawal of said pivot mount shaft through the pivot mounts of the pressing shoes.

14. A die assembly mounting system as described in claim 13 wherein said main pivot shaft includes an easily grasped handle by means of which said shaft is readily engaged with and disengaged from said main support arms, and further including means for locking said main pivot shaft in its operative position.

15. A die assembly mounting system as described in claim 13 wherein said pivot mount shaft includes an easily grasped handle by means of which said pivot mount shaft is readily shifted with respect to said pressing yoke forwardly extending formation when released therefrom by said locking means.

16. A die assembly mounting system as described in claim 13 in which the collar-pressing die assemblies used therewith are of the self-contained type including their own pressing yoke and supporting structure therefor, the said main support arms being laterally spaced apart a distance just sufficient to accommodate therebetween the opposite outer ends of the pressing yoke support structure of a self-contained pressing die of the type herein described, whereby the mounting system is capable of accommodating self-contained pressing dies as well as dies which include only the baseplate, collar-shape recess-forming elements and movable presser shoes with pivot mounts.

17. A die assembly mounting system as described in claim 13 wherein at least a portion of said die assembly locking supports is coupled to at least one of said main support arms and includes indexing means engageable with and effective to positionally index the die assembly baseplate with respect to the control apparatus.

18. A die assembly mounting system as described in claim 13 further including a heater plate of good thermal conductivity adapted to underlie the base plate of the collar-pressing die assembly in broad surface thermal transfer engagement therewith, at least one of said die assembly locking supports comprising a shelf member and an overlying clamping arm of which at least a portion is movable toward and away from said shelf member, said heater plate being seatable upon and securable to said shelf member, and the baseplate of the die assembly being pressable down against said heater plate by said clamping arm.

19. A die assembly mounting system as described in claim 18 wherein said locking support clamping arm carries indexing means effective to positionally index the die assembly baseplate with respect to the control apparatus.

20. A die assembly mounting system as described in claim 18 wherein said plurality of die assembly locking supports comprises, at least two such locking supports each comprising a shelf member and clamping arm as described and being spaced laterally apart to clamp together the outer side margins of said heater plate and die assembly baseplate forward of said main support arms, and at least one such locking support comprising a shelf member and clamping arm as described integral with at least one of said main support arms effective to clamp together the hear margins of said heater plate and die assembly baseplate.

21. A die assembly mounting system as described in claim 18 in which the collar-pressing die assemblies used therewith are of the self-contained type including their own pressing yoke and supporting structure therefor, the said main support arms being laterally spaced apart a distance just sufficient to accommodate therebetween the opposite outer ends of the pressing yoke herein described, whereby the mounting system is capable of accommodating self-contained pressing dies as well as dies which include only the baseplate, collar-shape recess-forming elements and movable presser shoes with pivot mounts.

22. A collar pressing control apparatus for use with collar-pressing dies of the type including a baseplate, collar shape pressing recess-forming elements secured to the baseplate, and collar-pressing shoes movable toward and away from the baseplate to press a collar therebetween, comprising in combination,

- a. securing indexing means for securing the collar-pressing die to the control apparatus in a predetermined indexed fixed position relative thereto,
- b. heater energizing and monitoring means connectable to the pressing die to selectably controllably heat the die,
- c. pressing shoes drive means couplable to the pressing shoes of the pressing die and effective to move the pressing shoes toward and away from the baseplate of the pressing die,
- d. shiftable means for carrying collar-shaped die blade means upon which a collar to be pressed is positionable, said shiftable means being shiftable to move the die blade means into and out of the collar-pressing recess of the pressing die between the die baseplate and pressing shoes, and
- e. selectively actuatable pressing control means and an actuator therefor operatively coupled to said drive means and to said collar-carrying shiftable means which when actuated and deactivated, automatically
 1. causes said shiftable means to shift the die blade means into and out of the pressing recess between the die baseplate and pressing shoes,
 2. causes said drive means to first partially shift the pressing shoes toward the baseplate sufficiently to engage and hold a collar to be pressed which is carried by the die blade means while permitting the die blade means to shift out of the collar and out of the pressing recess,
 3. then causes said drive means to fully shift the pressing shoes toward the baseplate to press the collar, and
 4. then causes said drive means to shift the pressing shoes away from the baseplate upon completion of pressing permit removal of the pressed collar.

23. Collar-pressing control apparatus as described in claim 22 further including a collar-trimming device and mechanism for operating the same, said pressing control means being coupled to said trimming device operating mechanism and effective to disable the latter and prevent a trimming operation whenever said pressing control means actuator is actuated.

24. Collar-pressing control apparatus as described in claim 22 wherein the pressing operation includes two phases, the first phase consisting of actuation of said pressing control means actuator to cause said shiftable means to shift the die blade means into the pressing recess and stop, and the second phase consisting of deactuation of said pressing control means actuator to operate said drive means to sequentially hold, press and release a collar and operate said shiftable means to simultaneously retract the same out of the pressing recess.

25. Collar-pressing control apparatus as described in claim 22 wherein said pressing control means includes, selectively settable timing means operatively coupled to said pressing shoes drive means effective to set between limits the time interval during which said drive means holds the pressing shoes in fully shifted pressing position to thereby set the collar-pressing time interval.

26. Collar-pressing control apparatus as described in claim 22 wherein said pressing control means includes, selectively

settable timing means operatively coupled to said pressing shoes drive means effective to set between limits the time interval during which said drive means holds the pressing shoes in fully shifted pressing position to thereby set the collar-pressing time interval, and timing means disabling means coupled to said timing means and controlled by said pressing control means actuator operative to disable said timing means from initiating a pressing timing cycle while said pressing control means actuator is actuated.

27. Collar-pressing control apparatus as described in claim 22 wherein said pressing control means includes lockout means operatively coupled to said pressing shoes drive means effective to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die while said pressing control means actuator is actuated.

28. Collar-pressing control apparatus as described in claim 22 wherein said pressing control means includes lockout means operatively coupled to said pressing shoes drive means effective to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die while said pressing control means actuator is actuated, and further including monitor means operatively coupled to said pressing shoes drive means effective after deactuation of said pressing control means actuator to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die beyond the collar-holding position and into the fully pressing

position until said shiftable means has shifted the die blade means out of the pressing recess, said monitor means being operatively coupled to said shiftable means and operatively responsive to the physical position thereof.

29. Collar-pressing control apparatus as described in claim 25 wherein said pressing control means includes lockout means operatively coupled to said pressing shoes drive means effective to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die while said pressing control means actuator is actuated.

30. Collar-pressing control apparatus as described in claim 26 wherein said pressing control means includes lockout means operatively coupled to said pressing shoes drive means effective to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die while said pressing control means actuator is actuated, and further including monitor means operatively coupled to said pressing shoes drive means effective after deactuation of said pressing control means actuator to prevent said drive means from moving the pressing shoes toward the baseplate of the pressing die beyond the collar-holding position and into the fully pressing position until said shiftable means has shifted the die blade means out of the pressing recess, said monitor means being operatively coupled to said shiftable means and operatively responsive to the physical position thereof.

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