Dec. 26, 1944. E. G. CHAMBERS ET AL 2,365,803

ARTICLE ASSEMBLING APPARATUS

Filed Oct. 16, 1942 4 Sheets-Sheet 1

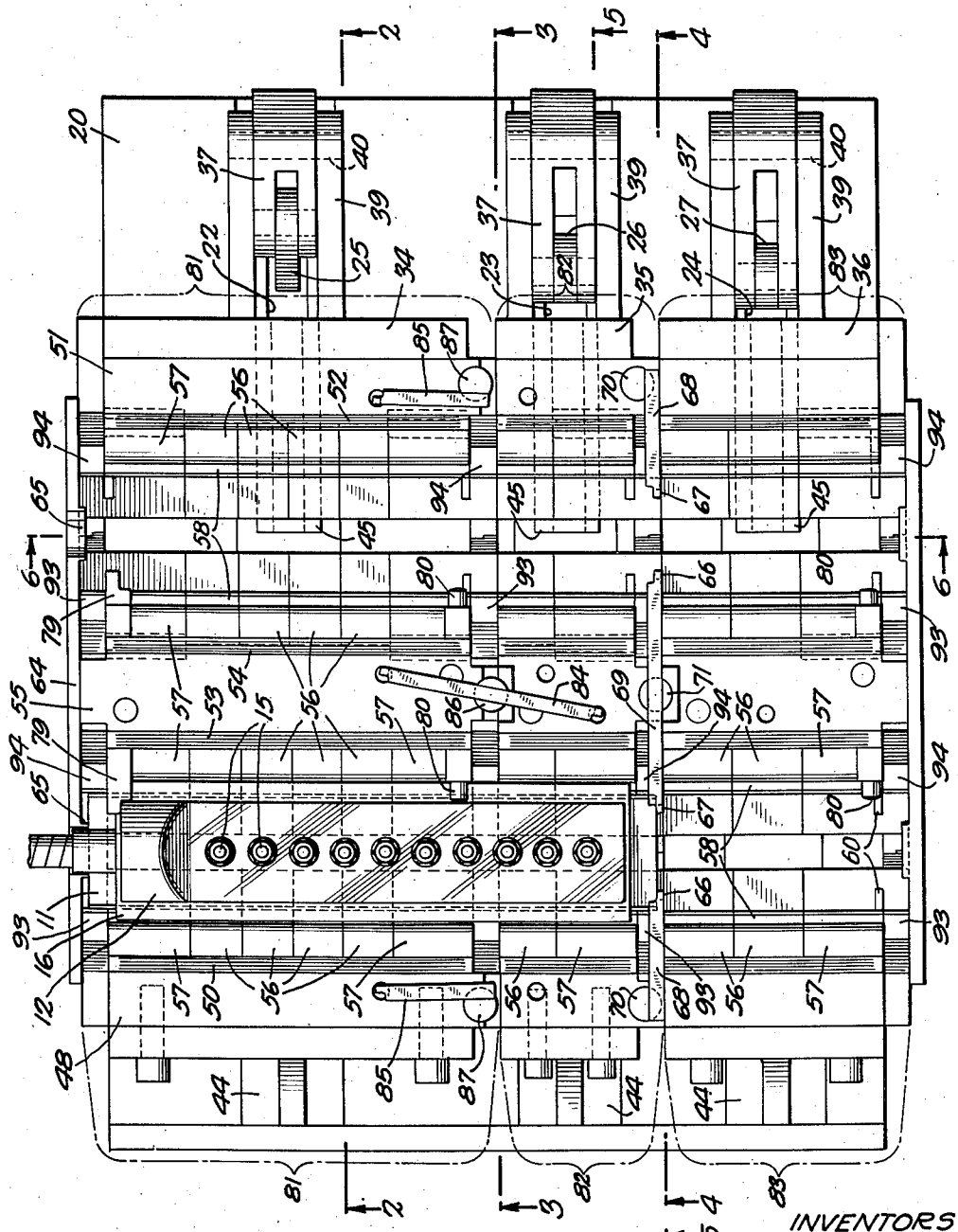


FIG. 1

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ARTICLE ASSEMBLING APPARATUS

Filed Oct. 16, 1942 4 Sheets-Sheet 2

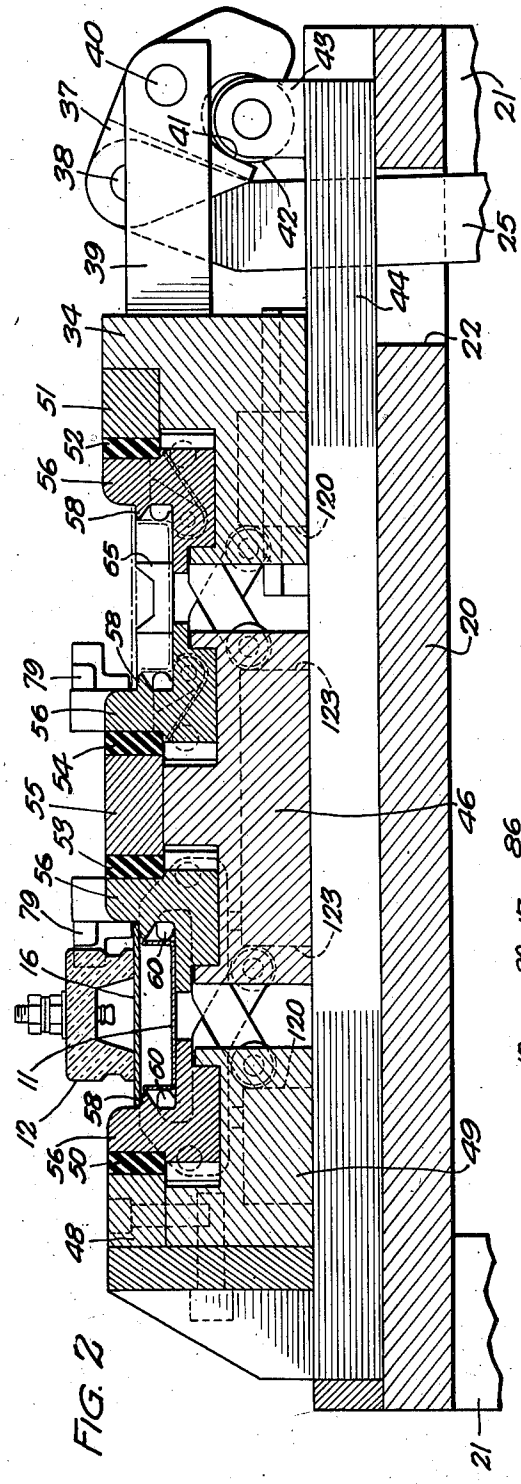


FIG. 2

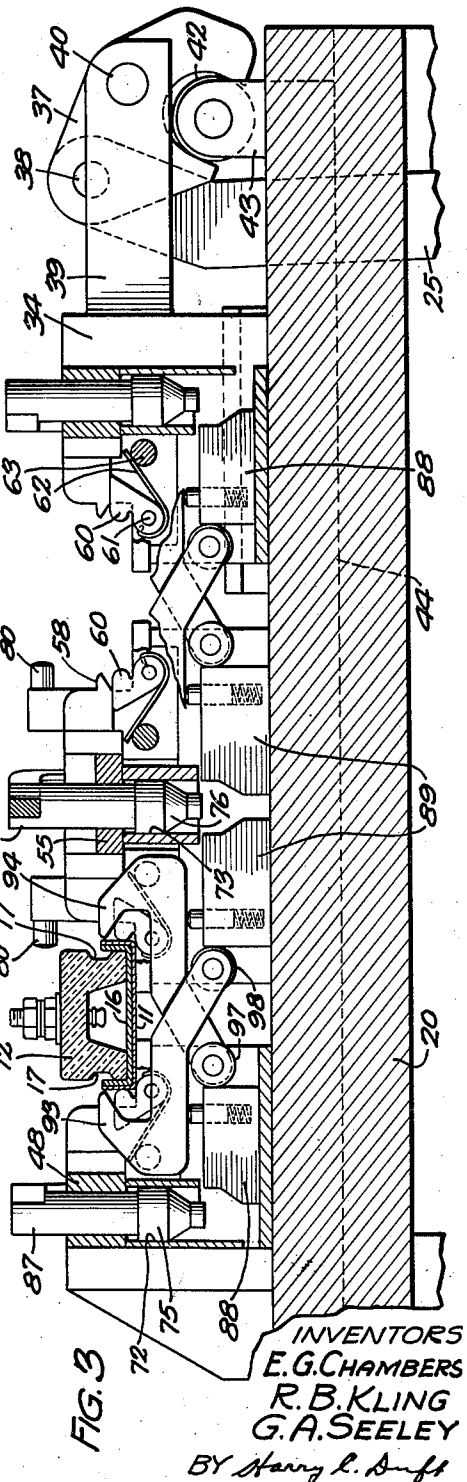


FIG. 3

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ARTICLE ASSEMBLING APPARATUS

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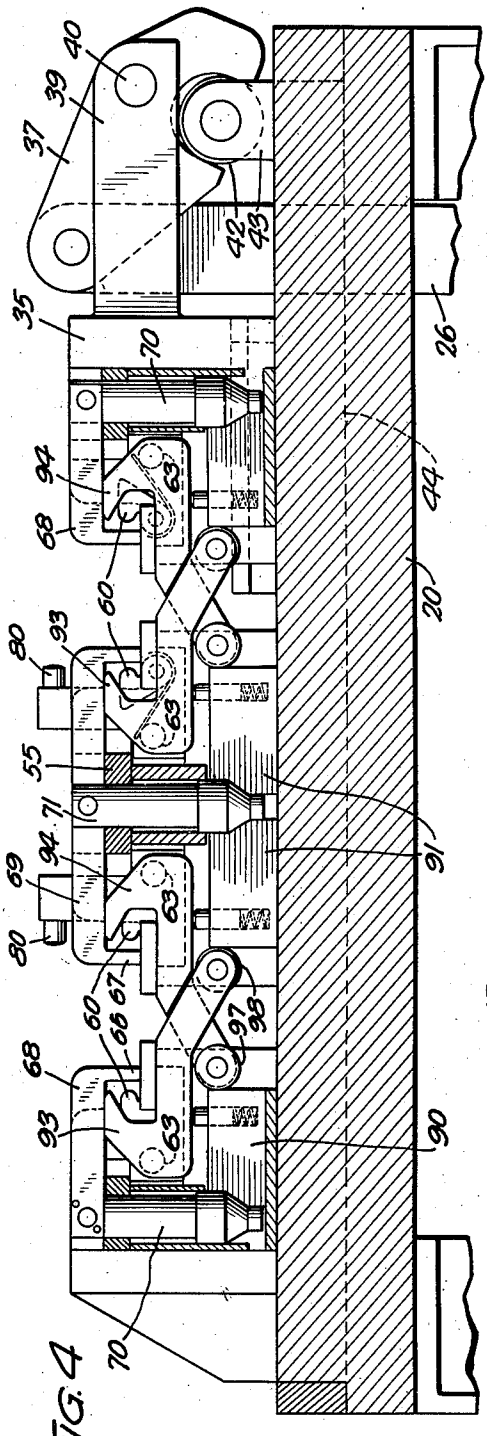


FIG. 4

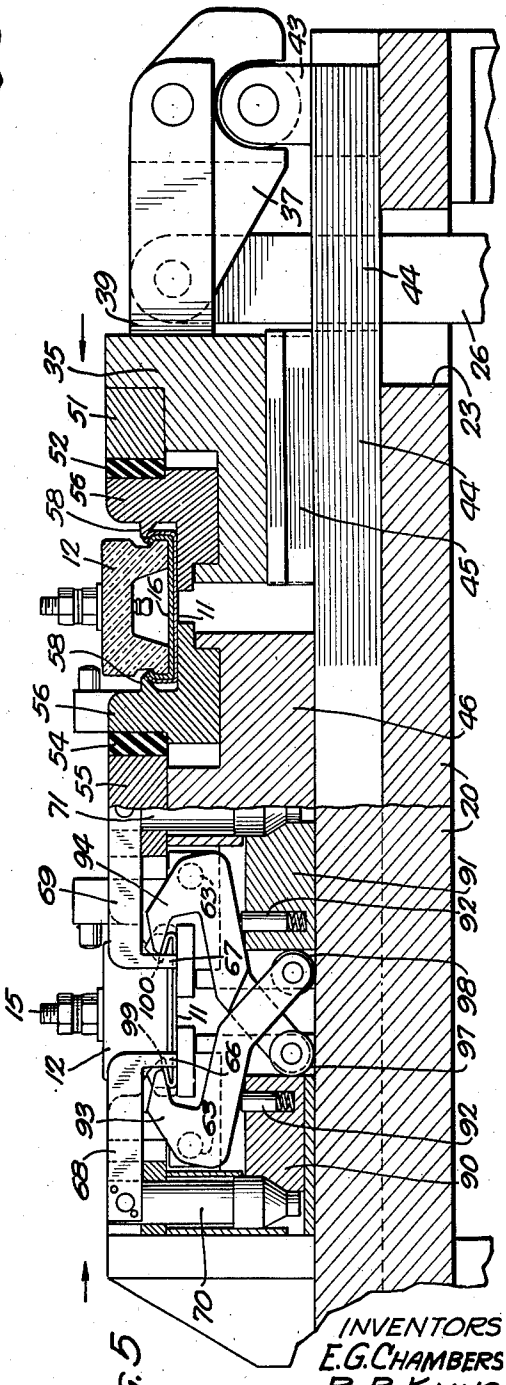


FIG. 5

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ARTICLE ASSEMBLING APPARATUS

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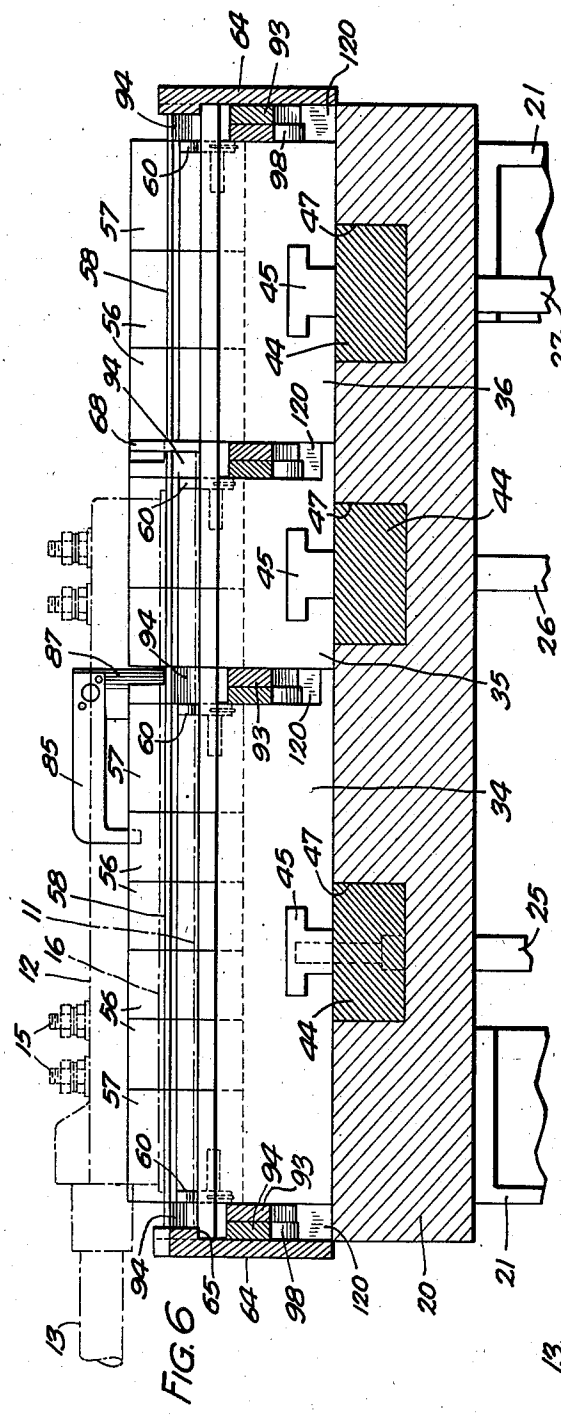


FIG. 6

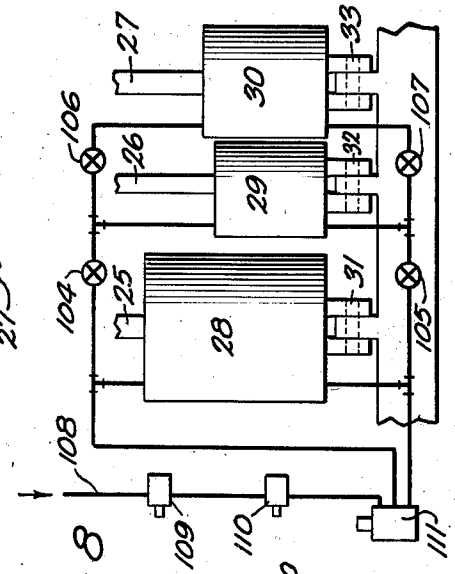


FIG. 8

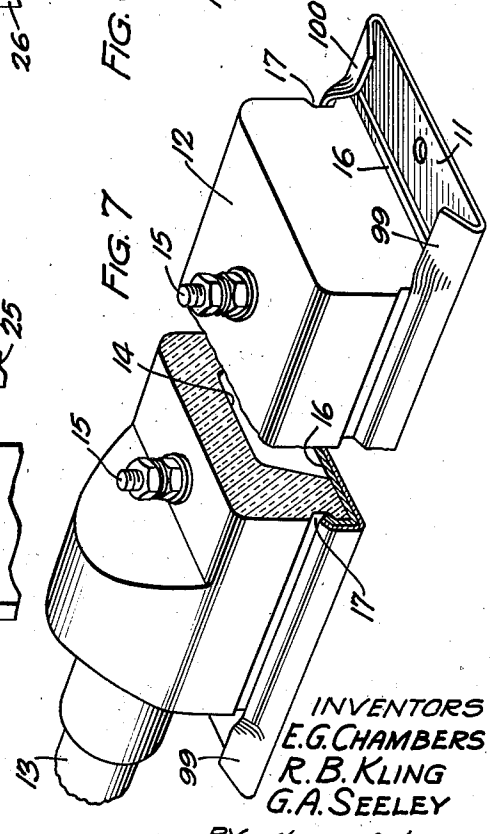


FIG. 7

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UNITED STATES PATENT OFFICE

2,365,803

ARTICLE ASSEMBLING APPARATUS

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Application October 16, 1942, Serial No. 462,282

8 Claims. (Cl. 153—1)

This invention relates to article assembling apparatus, and more particularly to apparatus for assembling a metallic sealing and mounting element on a ceramic body.

It is an object of the present invention to provide a simple apparatus for expeditiously assembling parts to form an article.

In accordance with one embodiment of the invention, apparatus is provided for quickly assembling metallic sealing pans and cork cushioning members to ceramic blocks, wherein a plurality of cooperating clamping blocks are resiliently connected to fixed and movable clamp actuators which are, in turn, positioned to be actuated by fluid pressure operated means to apply pressure to the sealing pan to bend it into clamping engagement with the ceramic block without damaging the block and wherein ceramic blocks of different lengths may be assembled with corresponding pans and insulators by selectively controlling the fluid pressure operated means and the clamping blocks.

A better understanding of the present invention may be had by reference to the following detailed description of one embodiment thereof when considered in conjunction with the accompanying drawings, wherein.

Fig. 1 is a plan view of an apparatus for attaching a cork cushion and a sealing pan to a ceramic terminal block, in which blocks of different lengths may have their cushions and pans attached to them;

Fig. 2 is a transverse vertical sectional view taken along the line 2—2 of Fig. 1 in the direction of the arrows, showing, in one position, the sealing pan, cork cushion, and ceramic block in position prior to the initiation of the assembling operation and in the other position showing the clamping elements without a sealing pan, cushion and ceramic block positioned on them;

Fig. 3 is a transverse vertical sectional view taken along the line 3—3 of Fig. 1 in the direction of the arrows showing a part of the control mechanism for the clamping blocks whereby they may be disabled when some sizes of ceramic blocks are having an insulator and pan attached to them in the apparatus;

Fig. 4 is a transverse vertical sectional view taken substantially along the line 4—4 of Fig. 1 in the direction of the arrows and showing others of the control means for the clamping blocks set in position to render the clamping blocks associated with them operative;

Fig. 5 is an irregular transverse sectional view taken substantially along the line 5—5 of Fig. 1 in the direction of the arrows and showing the clamping means in their operated position;

Fig. 6 is a longitudinal vertical sectional view taken substantially along the line 6—6 of Fig. 1 in the direction of the arrows showing a medium sized ceramic block in dot and dash lines placed in the apparatus preparatory to having a pan clamped to it;

Fig. 7 is a view in perspective of the article which is assembled in the apparatus, part being broken away to conserve space, and

Fig. 8 is a diagrammatic view of the fluid pressure circuit for actuating the apparatus.

In the drawings, wherein like reference characters designate the same parts throughout the several views, there is disclosed apparatus for attaching a sealing pan 11 (Fig. 7) to the underside of a block 12 of ceramic material to seal the terminal ends of wires from a cable 13 in a hollow 14 formed in the block 12. The block 12 has mounted on it terminal posts 15—15, to which the wires (not shown) from the cable 13 are to be attached. Since the sealing pan 11, which is made of sheet metal, is clamped onto the block 12 there would be a possibility of the block being cracked if the metal pan 11 contacted with the block during the assembly thereof and accordingly there is a cork cushion 16 interposed between the sealing pan and the block 12, which cushion is assembled with the sealing pan to the ceramic block 12. The block 12 is provided with longitudinally extending grooves 17—17, into which the edges of the pan 11 are bent in the apparatus constituting the present invention. In order that the pan may be readily secured to the block 12, it is preliminarily bent to a substantially U-shaped configuration, as shown in Fig. 2, before being operated upon in the present apparatus. Furthermore, in the apparatus constituting the present invention, the upwardly extending sides of the pan 11 are not only bent into clamping engagement with the block 12, but adjacent the ends of the pan 11 the sides of it are bent over to secure the cork cushion 16 in place and to prevent longitudinal movement of the block 12 with respect to the pan 11.

In the apparatus for performing these operations there is provided a table 20, having suitable legs or standards 21—21 for supporting it at any convenient height for an operator who is to operate the apparatus. The table 20 is provided with three apertures 22, 23 and 24 adjacent its right edge (Fig. 1), through which extend a series of piston rods 25, 26 and 27, respectively, all of exactly the same construction and all extending

downwardly to cylinders 28, 29 and 30 (Fig. 8) suitably positioned under the table and pivotally mounted, as shown at 31, 32 and 33 so that the piston rod and cylinder may rock slightly as fluid is admitted to the cylinders to actuate the piston rods. It should be noted that the cylinders 28, 29 and 30 are of different sizes, since each of them will, in the operation of the apparatus, be utilized to apply a different amount of pressure to moving parts of the apparatus, as will be described hereinafter. The apparatus mounted upon the table 20 is designed to simultaneously clamp sealing pans 11 onto two ceramic blocks 12 and is so constructed that the sealing pans of any one of three different lengths may be readily assembled to correspondingly proportioned blocks 12. As seen most clearly in Fig. 1, the three piston rods 25, 26 and 27 have associated with them, actuator members 34, 35 and 36, the size of which is generally proportional to the size of the cylinders 28, 29 and 30, shown in Fig. 8. The actuator members 34, 35 and 36 are each interconnected with their respective piston rod by linkage mechanism of exactly the same construction, only one of which will be described in detail herein. The linkage mechanism interconnecting the piston rod 25 with the actuator 34 comprises a toggle 37 pivotally connected to the piston rod at the upper end thereof by means of a pin 38 and also pivoted on a push rod 39 by means of a pin 40. The push rod 39 is fixed to the actuator 34, and the toggle 37 is provided with a notch 41, which receives a roller 42 mounted on an extending portion 43 of a slidable bar 44. Thereafter, when the piston rod 25 is moved downwardly, the roller 42 will serve as an abutment about which the toggle 37 will be rocked. This will result in the actuator 34 being moved to the left and in the bar 44 being drawn to the right (Fig. 2).

The actuator 34 is slidable with respect to the table 20 and is held in position with respect thereto by a T-shaped bracket 45, which is mounted on or formed integral with the bar 44 and the bar 44 extends under a block 46, suitably attached to the plate 20, the bar 44 being slidable in ways 47 formed in the table 20. From the foregoing it is believed to be apparent that when the piston 25 is moved downwardly, the bar 44 will be moved to the right and the rod 39 will be moved to the left (Fig. 2), to carry the actuator 34 and an actuator 48 mounted upon a block 49, which is, in turn, secured to the bar 44, toward each other. The actuator 48 has attached to its right hand surface (Fig. 2), a strip of soft rubber 50 and the actuator 34 carries a bar 51 having on its left hand surface a similar strip of soft rubber 52.

Positioned in alignment with the strips 50 and 52 are two similar strips 53 and 54 mounted upon a plate 55 secured to the block 46. Each of the strips of rubber 50, 52, 53 and 54 has mounted in abutting relation thereto a series of forming blocks 56 and 57, which will be urged to move relatively toward each other when the actuators 34 and 48 are moved toward each other. The forming blocks 56 and 57 have forming projections 58 formed thereon for engaging the upwardly extending sides of the sealing pan 11 to force it inwardly with respect to the ceramic block 12 after the ceramic block has been pushed down into the pan 11, as illustrated in Fig. 2, wherein one of the sealing pans 11 is shown held in position by locating pawls 60, most clearly shown in Figs. 2 and 3. The locating pawls 60 are pivoted on pins 61 and are each urged to the position shown in Figs. 2 and 3 by a leaf spring 62 fixed to the pawls 60 and bearing against a stop pin 63. The pins 61 are mounted at opposite ends of the blocks 57 so that they will properly seat the pan in its transverse position with respect to the apparatus. The stop pins 63 are also mounted in the blocks 57 to properly position the pawls 60.

At the rear end of the apparatus, as viewed in Fig. 1, there is provided a plate 64 having projections 65—65 for locating two pans 11 in the apparatus in position to receive a cork insulator 16 and ceramic block 12. The forward end of the pan is properly positioned by means of a pair of locating fingers 66 and 67 mounted on the ends of a pair of levers 68 and 69, respectively. The levers are mounted upon the upper ends of interposer members 70 and 71, respectively, which are slidable in bearing portions 72 and 73 of the blocks 49 and 46, respectively. Each of the interposer members 70 and 71 is provided with a shouder portion 75 and 76, which fits snugly in the bearing portions 72 and 73 and serves to hold the interposer member from being completely removed from its bearing due to the engagement of the upper surface of said shoulder with the actuator 48 and plate 55 (Fig. 3).

When a sealing pan 11 and cork cushion 16 are to be assembled, the cork cushion is placed on the upper edges of the forming projection 58. When the ceramic block 12 is pushed down into the sealing pan 11, the cork cushion will be bent around to position between the three surfaces of the pan 11 and the block 12. Then, when the piston 25 is moved downwardly, the forming blocks 56 and 57 will be resiliently urged to bend over the upper edges of the vertical portions of the sealing pan into the grooves 17 formed in the block 12. The block 12, in being positioned with respect to the sealing pan 11 and cork cushion 16, is set into engagement with a stop 79 (Figs. 1 and 2), which locates it longitudinally and transversely and into engagement with a stop 80, which serves to locate the block transversely of its length. The stops 79 and 80 are so positioned that after the block has been forced down into the pan 11 manually, the upper surface of the block will, as seen most clearly in Figs. 2 and 5, be positioned below the under surface of the stops whereby when the apparatus is operated, the stops will not engage the ceramic block.

The portion of the apparatus described hereinbefore is that utilized for bending the upper edges of the sealing pan 11 into the notches 17 and it will be understood that sealing pans 11, cork cushion 16, and blocks 12 of three different lengths may be assembled two at a time in the apparatus, three sections 81, 82 and 83 being provided in each half of the apparatus for assembling blocks 12, pans 11 and cushions 16 of three different lengths. The block 12, as shown in Fig. 1, is the medium sized block, but it will be understood that a block which extends substantially the length of the section 81 might be assembled by properly setting up the apparatus or that a block the length of sections 81, 82 and 83 might be assembled by a proper setting of the apparatus. If a block of substantially the length indicated by the section 81 is to be assembled, a lever 84 of exactly the same construction as the lever 69 may be set to position transversely of the apparatus, as the lever 69 is shown in Fig. 1, and in that case the lever 84 will serve the same purpose for a shorter length terminal assembly that the lever 69 serves for

the medium sized assembly. Similarly, the lever 69 may be swung to a position similar to the position shown for lever 84 if the longest or third size assembly is to be assembled in the apparatus.

In addition to serving as a positioning means for the sealing pans 11 to be assembled with blocks 12, the lever 84 serves, when in the position shown in Fig. 1, to hold the interposer member 70 in its upper position, due to the fact that the downwardly extending locating fingers 66 and 67 will engage the plate 55 and prevent the interposer member 70 from assuming its lowermost position. In other words, the interposer member will be held in the position shown in Fig. 3. However, if the lever 84 is moved to position parallel with the lever 69 and a lever 85, similar to lever 68, is moved to position parallel with lever 68, the interposer members 86 and 87 associated with levers 84 and 85 will be dropped to a position similar to that occupied by the interposer members 70 and 71, as shown in Fig. 4, where they will block the movement of camming blocks 88 and 89. With the apparatus arranged as shown in Fig. 1, that is, with the interposer members 86 and 87 held in their raised position and the interposer members 70 and 71 in their lower positions, the interposers 70 and 71 will block the movement of camming blocks 90 and 91, respectively. The camming blocks 90 and 91 and the camming blocks 88 and 89 are each provided with spring pressed plungers 92, which normally urge forming levers 93 and 94 to rock counterclockwise and clockwise, respectively, about the stop pins 63, on which they are pivoted. The levers 93 and 94 carry rollers 97 and 98, respectively, at their lower ends for engaging the inner surfaces of the camming blocks 90 and 91, and, thus, if the movement of the camming blocks 90 and 91 is blocked by their associated interposer members 70, 71, 86 or 87 being in their lowered position, the spring pressed plungers 92 will be depressed and the levers 93 and 94 will be rocked about the stop pins 63, as shown most clearly in Figs. 1, 3, 4 and 5. It should be noted that the interposer members 71 and 86 are of exactly the same construction and that each of them blocks the movement of two camming blocks 89 when the interposer members are in their lowered position, as shown in Figs. 4 and 5. When the push rod 39 is moved to the left and the bar 44 is moved to the right (Figs. 1 to 5, inclusive) any of the forming levers 93 and 94, whose associated interposer members 70, 71, 86 or 87 is in its lowermost position will serve as cam surfaces against which the rollers 97 and 98 will be forced to travel downwardly, and, accordingly, the levers 93 and 94 will be rocked to bring their adjacent forming ends down onto the upwardly extending ends of the sealing pan 11 to bend it to the position shown at 99 and 100 in Figs. 5 and 7. When the interposer members 70, 71, 86 or 87 are in their upper position, the camming blocks 88, 89, 90 and 91 will be free to move and will not cause the forming levers 93 and 94 to operate. However, the forming levers at the front and rear of the apparatus will operate each time their associated actuators 34 or 36 are operated since their rollers 97 and 98 engage stationary blocks 120 and 123.

Thus the forming levers 93 and 94 act as selectively operable means for overforming portions of the sealing pan or metallic member 11 beyond the ends of the ceramic member 12.

It will be understood that with the construction described hereinbefore, any one of three different lengths of terminal assemblies may be assembled in the apparatus by properly adjusting the levers 84, 85, 68 and 69 and that two similar assemblies may be formed in the apparatus at one time. When the levers 84 and 85 are set in their position extending transversely of the apparatus, only the cylinder 28 should be supplied with fluid under pressure and, accordingly, valves 104 and 105 should be closed to prevent the flow of fluid to the cylinders 29 and 30. However, if the apparatus is set up as shown in Fig. 1, the valves 104 and 105 should be opened and valves 106 and 107 should be closed so that fluid under pressure will be supplied to the cylinders 28 and 29. If it is desired to assemble the longest terminal assembly capable of being assembled in the apparatus, valves 104, 105, 106 and 107 should all be opened and the levers 68 and 69 should be shifted to position parallel with the position shown for levers 85 and 86 in Fig. 1.

Fluid under pressure may be supplied to the apparatus through a supply line 108 and through two hand-operated valves 109 and 110, both of which must be held operated by the operator's hands in order to insure that the operator will not get his hands caught in the apparatus. In addition to the valves 109 and 110 in the fluid supply line 108, there is provided a treadle actuated valve 111, which must also be operated to supply the fluid under pressure to operate the cylinders 28, 29 and 30. This valve also controls the release of fluid from the cylinder after it has performed an assembling operation.

While the apparatus has been described as one in which three different lengths of terminal assemblies may be assembled, it will be understood that further sections might be added to those shown at 81, 82 and 83 to adapt the apparatus for assembling more sizes of assemblies. However, in the operation of the apparatus as shown, an operator may select which ones of the three cylinders 28, 29 and 30 is to be operated, may set the valves as described hereinbefore, may set the levers 85, 86, 68 and 69 to correspond with the setting of the valves and thereby set the apparatus to assemble any one of the three sizes of assemblies, two at a time.

What is claimed is:

1. An article assembling apparatus comprising a plurality of groups of bending blocks, means individual to each group of blocks for resiliently supporting it, an actuator for each of said means resiliently supporting a group of the bending blocks, means for supplying power to said actuators, and selectively operable means to control the supply of power to the actuators.

2. An article assembling apparatus comprising a plurality of fluid actuated devices, a common source of fluid under pressure, means selectively operable to direct said fluid under pressure to one or more of said fluid actuated devices, a series of forming members resiliently connected to each of the fluid actuated devices, a stationary block, and a series of forming members resiliently connected to said stationary block for cooperation with the first mentioned forming members to bend a metallic member into gripping engagement with a frangible member.

3. In an apparatus for simultaneously assembling two frangible members with two metallic members, a stationary block, a series of forming members supported by said block, resilient means interposed between the forming members and

said block, a pair of oppositely movable actuators, a series of forming members supported by said actuators, resilient means interposed between the forming members and the actuators, and a single fluid actuated lever for imparting movement to said actuators to move them toward the stationary block and simultaneously bend the metallic members into gripping engagement with the frangible members.

4. In an apparatus for simultaneously assembling two frangible members with two metallic members, a stationary block, a series of forming members supported by said block, resilient means interposed between the forming members and said block, a pair of oppositely movable actuators, a series of forming members supported by said actuators, resilient means interposed between the forming members and each of the actuators, a single fluid actuated lever for imparting movement to said actuators to move them toward the stationary block and simultaneously bend the metallic members into gripping engagement with the frangible members, and selectively operable means individual to each of said actuators for crimping the ends of said metallic members adjacent the ends of the frangible members.

5. In an apparatus for assembling a metallic sealing pan and a cork cushion on a ceramic block, a series of forming members extending longitudinally of said ceramic block, a pair of actuators one for each of a series of forming members, resilient means interposed between each of said actuators and said forming members associated with it, and fluid actuated means for imparting movement to one of said actuators through the resilient means to the forming members to apply a substantially equal pressure to each of said forming members to bend the sealing pan and cork cushion into gripping engagement with the ceramic block without damaging the ceramic block.

6. In an apparatus for assembling ceramic members with metallic members, a series of resiliently mounted forming members, means for imparting relative movement to said resiliently mounted forming members to form the metallic member into gripping engagement with the ceramic member, and selectively operable means for overforming portions of the metallic member beyond the ends of the ceramic member.

7. In an apparatus for assembling ceramic members with metallic members, a series of resiliently mounted forming members, means for imparting relative movement to said resiliently mounted forming members to form the metallic member into gripping engagement with the ceramic member, selectively operable means for overforming portions of the metallic member beyond the ends of the ceramic member, and interposer members settable to cause predetermined ones of said overforming members to operate.

8. In an apparatus for assembling ceramic members with metallic members, a series of resiliently mounted forming members, means for imparting relative movement to said resiliently mounted forming members to form the metallic member into gripping engagement with the ceramic member, selectively operable means for overforming portions of the metallic member beyond the ends of the ceramic member, interposer members settable to cause predetermined ones of said overforming members to operate, and slidable camming blocks cooperating with the interposer members, said interposer members cooperating with said slidable camming blocks to effect the actuation of said overforming means.

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