Dec. 15, 1942. J. T. KANE 2,304,927

ASSEMBLING APPARATUS

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FIG. 1

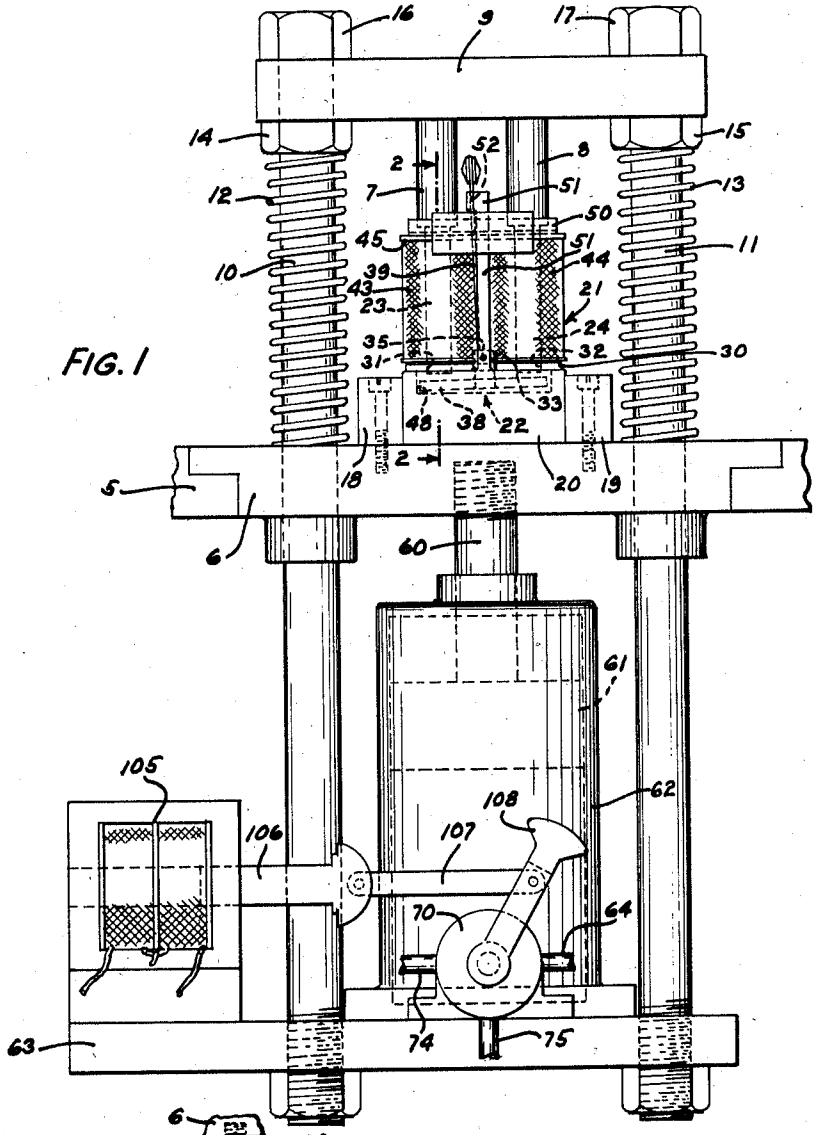
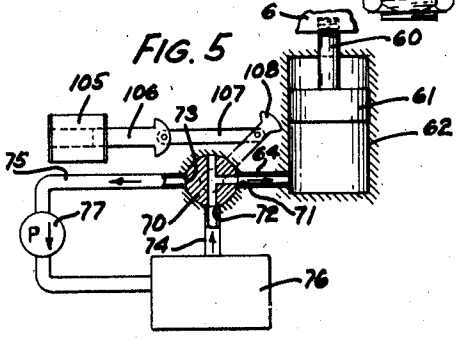


FIG. 5



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FIG. 2

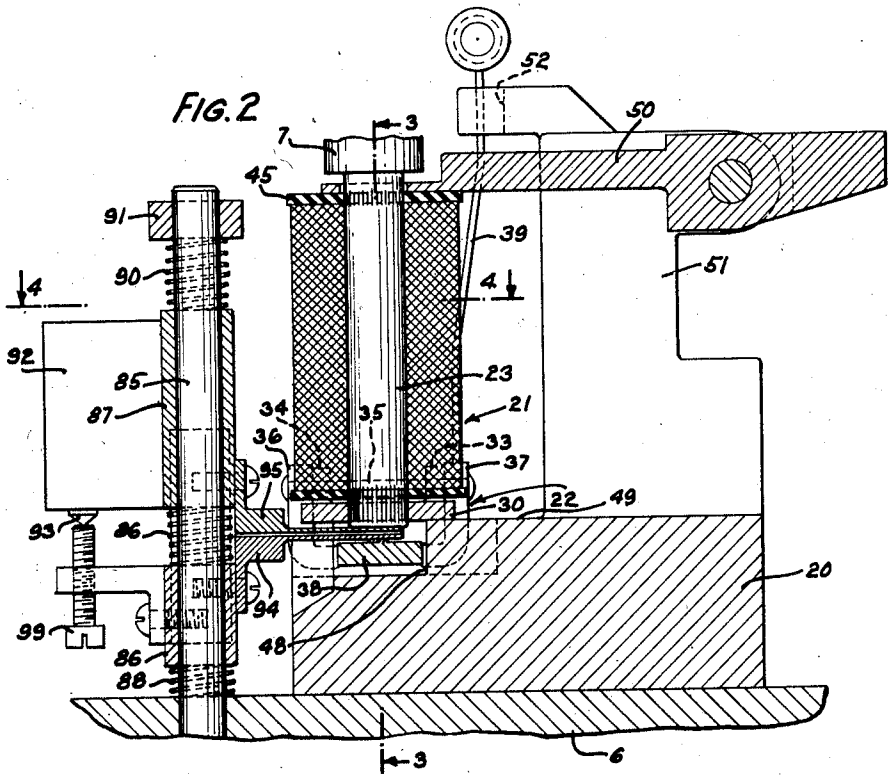


FIG. 3

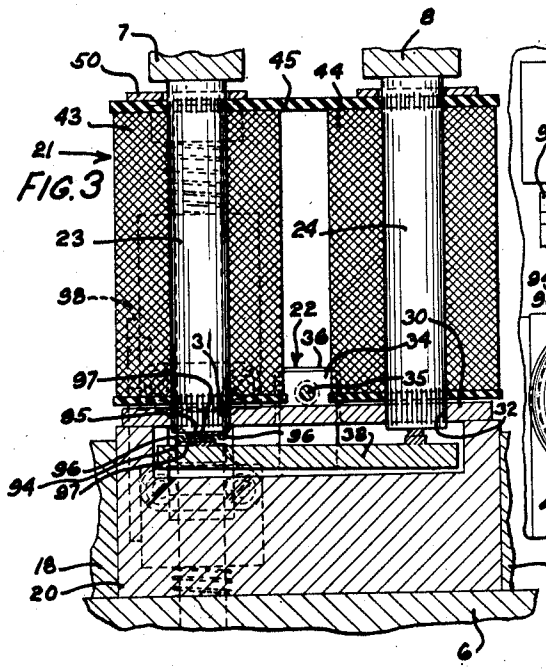
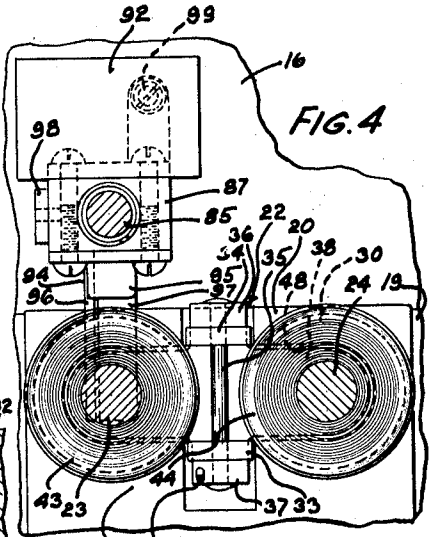


FIG. 4



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UNITED STATES PATENT OFFICE

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ASSEMBLING APPPARATUS

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Application January 11, 1940, Serial No. 313,397

3 Claims. (Cl. 29—84)

This invention relates to assembling apparatus and more particularly to apparatus for assembling armatures on ringers to be used in telephone apparatus.

It is an object of the present invention to provide a precision apparatus for assembling parts in a relatively exact position with respect to one another, thereby to eliminate the necessity of adjusting them after their assembly.

In accordance with one embodiment of the invention, there is provided a hydraulically actuated press for forcing armature assemblies onto the cores of coils to be used in a telephone ringer. The coils and the armature assembly which is to be forced onto the cores of the coils are mounted in a fixture and placed on a table with the armature assembly positioned beneath the coils. A pair of anvils are moved downwardly pneumatically against the upper ends of the cores, thereby to push the lower ends of the cores into the armature assembly. Mounted on the table is an electrical gaging element, which is positioned between one leaf of the armature and the end of its associated core, and when the armature assembly has been forced onto the cores a predetermined distance, the electrical gage will complete a circuit to open a valve in the pneumatic system to release the pneumatic pressure on the anvils.

A better understanding of the invention will be had by reference to the following detailed description when considered in connection with the accompanying drawings, wherein

Fig. 1 is a front elevational view of an assembling apparatus embodying the features of the present invention;

Fig. 2 is a vertical sectional view on an enlarged scale, taken on the line 2—2 of Fig. 1 in the direction of the arrows;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2 in the direction of the arrows;

Fig. 4 is a horizontal sectional view taken along the line 4—4 of Fig. 2 in the direction of the arrows; and

Fig. 5 is a schematic diagram of the pneumatic system.

Referring to the drawings, wherein like reference characters designate the same parts throughout the several views, the apparatus forming the subject matter of the present invention may be mounted in a suitable bench 5 with the actuating mechanism for the apparatus positioned beneath the bench and the operating parts thereof extending above the bench. Fixed to the bench is a bed plate 6, which supports all of the apparatus and serves as the lower anvil of a press comprised of the bed plate 6 and a pair of vertically reciprocable anvils 7 and 8. The anvils 7 and 8 are secured to a cross head 9 mounted upon a pair of rods 10 and 11, which extend through the bed plate 6 and have coil springs 12 and 13 surrounding them and interposed between the bed plate 6 and nuts 14 and 15, which cooperate with other nuts 16 and 17 to fix the cross head 9 to the rods 10 and 11.

Mounted on the upper surface of the bed plate 6 are a pair of guide blocks 18 and 19, which serve to guide a fixture, designated generally by the numeral 20, into position to support the loosely assembled parts of a ringer, designated generally by the numeral 21, into position to have its armature assembly 22 fixed to its cores 23 and 24. In the particular ringer, which the apparatus being described is adapted to assemble, the armature assembly 22 comprises a yoke 30 having a pair of apertures 31 and 32 formed in it for receiving cores 23 and 24 in a force fit. The extending ends of the cores 23 and 24 are knurled and are of such dimensions that when they are forced into the apertures 31 and 32 in the yoke 30, they will securely fasten the yoke to the cores. The yoke 30 is provided with a pair of ears 33 and 34, which extend at right angles to the main body of the yoke and support a pivot pin 35, on which lugs 36 and 37, formed at right angles to the body portion of an armature 38, may be pivoted. The lug 37 has a clapper 39 fixed in it, which, in the completed ringer, will strike the gongs of the ringer, a suitable biasing spring (not shown) being provided for normally holding the clapper adjacent one of the gongs (not shown), in which position one end of the armature will be in engagement with an end of one of the core members. The cores 23 and 24 have coils 43 and 44 wound on them and are interconnected by an insulator 45, which is mounted on the upper ends of the cores 23 and 24 prior to the mounting of the ringer 21 and its armature assembly 22 in the fixture 20.

The fixture 20 has a cut out 48 formed therein, into which the armature 38 extends and is freely movable when the yoke 30 rests on the upper surface of the bed 49 of the fixture, and the fixture is provided with a clamp plate 50, which is pivoted to an upwardly extending arm 51 of the fixture. The clamp plate 50 has suitable apertures in its surface to receive the upper ends of the cores 23 and 24, thereby to hold the ringer 21 and armature assembly 22 in the proper

relation for assembling them together, a slot 52 in the arm 51 being provided to receive the extending end of the clapper 39 and move one of the ends of the armature 38 into engagement with the lower end of the core 24.

A piston rod 60 is fixed to the under side of the bed plate 6 and has a piston 61 on its lower end, which is slidable in a cylinder 62. The cylinder 62 is mounted on a supporting frame 63 attached to the lower ends of the rods 10 and 11 whereby, when fluid under pressure is admitted to the lower end of the cylinder 62 through a pipe 64, the piston 61 will be forced upwardly with respect to the cylinder 62, but since the piston 61 is secured to the bed plate 6, the cylinder 62 and its supporting frame will actually move downwardly away from the bed plate 6, and in so doing, will cause the rods 10 and 11 to move downwardly against the action of the springs 12 and 13. As will be obvious, this movement of the rod downwardly will cause the anvils 7 and 8 to move downwardly and force the cores 23 and 24 into the apertures 31 and 32 in the yoke 30 if a fixture 20 carrying a ringer 21 and armature assembly 22 are in position under the anvils.

The supporting framework 63 has mounted thereon a three-way valve 70, which controls the supply of fluid under pressure to the pipe 64. This three-way valve is provided with three ports 71, 72 and 73, the port 71 communicating with the pipe 64, the port 72 communicating with a flexible pipe 74 and the port 73 communicating with a flexible pipe 75. The pipe 64, as pointed out hereinbefore, is connected to the lower end of the cylinder 62 and the flexible pipe 74 is connected, through a suitable accumulator 76, to a pump 77, whereby fluid under pressure may be forced into the accumulator by the pump 77, and if the valve 70 is in the position shown, the fluid under pressure will pass through the pipe 64 and into the lower end of the cylinder. However, if the valve 70 is shifted to its other position, the pipe 64 will be connected through the port 73 and flexible pipe 75 to the other side of the pump 77 and the springs 12 and 13 may return the anvils 7 and 8 to their normal inoperative position.

In the drawings, the valve 70 has been shown in its operative position, that is, the position where the fluid under pressure is actuating the piston 61 and all of the other parts of the apparatus have been shown in a corresponding position.

Mounted adjacent the rear edge of the bed plate 6 is a supporting stud or rod 85, on which there are slidably mounted two blocks 86 and 87, a light coil spring 88 being interposed between the upper surface of the bed plate 6 and the block 86, a spring 89 being interposed between the blocks 86 and 87 and a spring 90 being interposed between the upper surface of the block 87 and a collar 91 fixed to the upper end of the rod 85. The block 87 has a very light electrical switch 92, known as a "micro-switch," mounted upon it, the actuating plunger 93 of which extends downwardly from the switch. The blocks 86 and 87 carry gage feelers 94 and 95, which are adapted to extend between the lower end of the core 23 and its associated end of the armature 38. The gage feelers have relatively thick and thin portions 96 and 97, which make the feelers comparatively strong and which will, nevertheless, permit them to be moved relatively close together to permit their insertion in the small space between the armature and end of the ringer core. The block 87 has a guide plate 98 fixed to it which slidably engages the side of the block 86 to properly position the feelers 94 and 95 with respect one to another and the block 86 has an L-shaped member 100 on it in which an adjustable abutment 99 is threaded for engagement by the actuating plunger 93 of the micro-switch 92. The micro-switch 92 is normally open, and upon being closed will connect electrical current from a source (not shown) to a solenoid 105 mounted upon the supporting frame 63. The solenoid 105 has a plunger core 106, which it will attract upon energization, and the plunger core 106 is connected by a link 107 to an actuating lever 108 of the valve 70, whereby, when the solenoid 105 is energized, the valve 70 will close the port 72 and interconnect the ports 71 and 73.

A better understanding of the invention will be had from the following brief description of the operation of the hereinbefore described apparatus.

After a fixture 20 has had an armature assembly 22 positioned thereon, with the armature 38 in the cut out 48 and with the yoke 30 resting on the upper surface of the bed of the fixture, the clapper 39 may be inserted in the slot 52 to move one of the surfaces of the armature 38 into engagement with its associated core 24 and the clamp plate 50 may be moved down to engage the upper ends of the cores 23 and 24. A fixture with a loosely assembled ringer thus mounted in it may be slid between the guide blocks 18 and 19, it being assumed that the anvils 7 and 8 are in their uppermost position, and as the fixture is slid between the blocks 18 and 19, the gage feelers 94 and 95 will enter the space between the end of the core 23 and the armature. It should be noted that the spring mounting of the blocks 86 and 87 will permit the gage feelers 94 and 95 to enter into the space between the armature and core even if there are slight variations in dimensions of the various parts being assembled. After the fixture carrying the loosely assembled parts has been slid to the just described position, the lever 108 of the valve 70 may be operated manually to move it to the position shown, whereupon fluid under pressure will be admitted to the lower end of the cylinder 62 and the anvils 7 and 8 will, therefore, be moved downwardly through the action of the rods 10 and 11. As soon as the yoke 30 has been forced onto the armature cores 23 and 24 a predetermined distance, the gage feelers 94 and 95 will be moved to a position where the abutment 99 will move the actuating plunger 93 of micro-switch 92 to energize the solenoid 105, thereby causing the solenoid to attract its core 106 and through the link 107 move the lever 108 to the position opposite to that shown. When the valve 70 moves to the position opposite to that shown, the fluid under pressure in the cylinder 62 will be permitted to pass back through ports 71 and 73 and the pump 77 to the accumulator 76 and the fluid under pressure in the accumulator 76 will be prevented from getting into the lower end of the piston due to the fact that the port 72 is now closed.

Although a specific embodiment of the invention has been described hereinbefore, it will be understood that many modifications thereof may be made without departing from the invention, which is to be limited only by the scope of the appended claims.

What is claimed is:

1. An article assembling apparatus including a pressure applying means and an actuator

therefor, and control means for said actuator, said pressure applying means being adapted to press the components of an article to such an extent that opposed parts thereof are at a predetermined spacing, said control means comprising movable gage members positioned to engage the opposed parts of the article being pressed to gage the distance between said parts, means for supporting said gage members in position to be engaged by the opposed parts of the article and to be moved thereby, and means actuated by said gage members when said gage members have been moved by the article parts to detect the predetermined spacing for interrupting the operation of the actuator.

2. An article assembling apparatus including pressure applying means and an actuator therefor and control means for said actuator, said pressure applying means being adapted to press the components of an article to such an extent that opposed parts thereof are at a predetermined spacing, said control means comprising a pair of feeler gages, a block for supporting one of said feeler gages, a switch mounted on said block, a second block for supporting the other feeler gage, a switch actuator on said second block, means for supporting said blocks in position to hold the feeler gages between the said opposed parts of the article for movement by said opposed parts, resilient means interposed between said blocks and normally holding them apart, and other resilient means for permitting movement of the blocks simultaneously, said switch being operable for interrupting the operation of the actuator when said blocks have been moved toward each other to detect the predetermined spacing.

3. An article assembling apparatus including pressure applying means and a hydraulic actuator therefor and control means for said actuator, said pressure applying means being adapted to press the components of an article to such an extent that opposed parts thereof are at a predetermined spacing, said control means comprising a gage member positioned to engage the opposed parts of an article being pressed to gage the distance between said parts, means for supporting said gage members in position to be engaged by the opposed parts of the article and to be moved thereby, and means actuated by the gage members when the gage members have been moved by the article parts to detect the predetermined spacing for interrupting the operation of the hydraulic actuator including a three-way valve operable under control of the means actuated by the gage members, said three-way valve being manually operable to supply the fluid under pressure to the hydraulic actuator and being operable under control of the gage members to interrupt the flow of fluid to said actuator.

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