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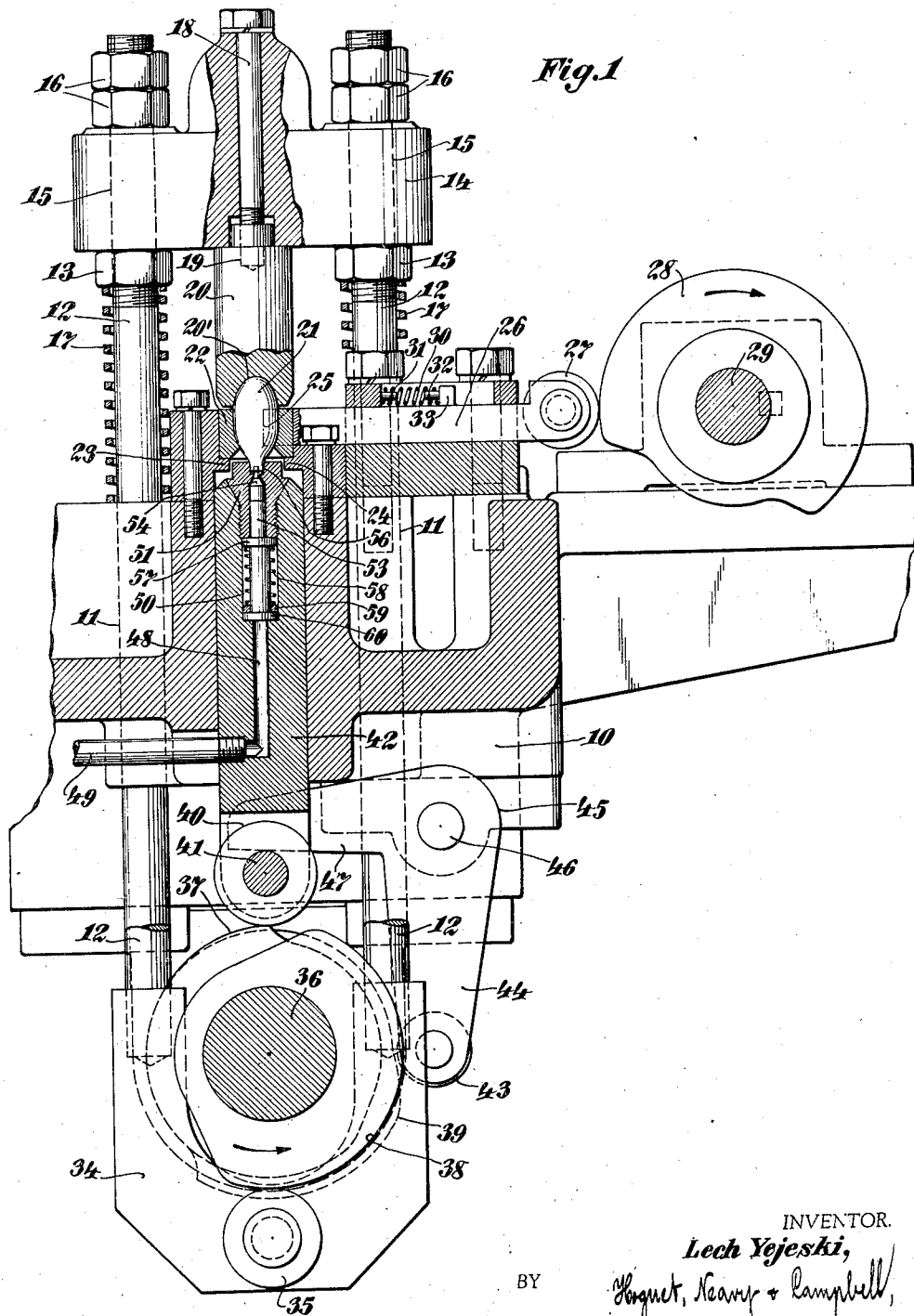
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APPARATUS FOR MANUFACTURING COMPRESSED FLUID CONTAINERS

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## UNITED STATES PATENT OFFICE

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APPARATUS FOR MANUFACTURING  
COMPRESSED FLUID CONTAINERS

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3 Claims. (Cl. 228-73)

The present invention relates to containers for compressed fluids and to an improved method and apparatus for their manufacture.

More specifically, it relates to small containers of the type used for charging liquid in syphon bottles with a gas. In such an operation, a container of this type, which is filled with a gas under pressure, is pierced to allow the gas contained therein to escape into the liquid in the syphon bottle, so that the liquid may be suitably treated. For example, carbonated water has been obtained in this fashion by treating water with carbon dioxide.

Heretofore, it has been extremely difficult to keep high pressure fluid containers of this type free from leakage because of the difficulty of closing effectively the opening through which the container is filled.

An object of my invention, accordingly, is to provide a container for high pressure fluids which is effectively closed to prevent leakage of the contents thereof.

Another object of the invention is to provide a container of the above character which is filled with fluid under pressure and then sealed in a simple and effective manner.

A further object of the invention is to provide an improved method whereby containers of the above character may be readily filled with fluid under pressure and then sealed.

A further object of my invention is to provide an improved apparatus by means of which containers of the character above described may be effectively manufactured.

My improved non-leaking seal for high pressure fluid containers of this type is obtained by driving a punch into the center of the neck of the container. In practice it is found that the closure is more effective if the punch is formed so that it has a greater axis in one direction than in another. This operation deforms the metal in the neck and tends to crowd it into the filling opening, providing an effective closure therefor. The punch causes the metal about the periphery of the neck to be stressed in tension, so that the metal crowded into the opening is under compression, thus forming a tight and effective seal.

Additional objects of the invention will be apparent from the following detailed description and from the accompanying drawings, in which:

Figure 1 is a view in elevation illustrating an apparatus for filling and sealing high pressure fluid containers in accordance with this invention;

Figure 2 is an enlarged view in vertical section,

taken on a plane similar to the plane of the section in Figure 1, showing the first step in the manufacture of the container, wherein it is charged with gas;

Figure 3 is a view similar to Figure 2, showing the second step in the manufacture of the container wherein a punch is forced into the center of the neck thereof;

Figure 4 is a view similar to Figure 2 showing the finished container from which the punch has been withdrawn;

Figure 5 is a view in section of part of the apparatus taken along the line 5-5 of Figure 2 and looking in the direction of the arrows;

Figure 6 is a plan view showing the top of a ram and a punch used in the operations illustrated in Figures 2, 3 and 4;

Figure 7 is a view of a container constructed in accordance with this invention showing the recessed neck after the sealing operation has been completed.

Referring to Figure 1, the frame of an apparatus constructed in accordance with this invention is shown at 10 and is formed with guide ways 11 in which a plurality of rods 12 are slidably mounted. A portion near the upper extremities of the rods 12 is threaded to receive the nuts 13, which are adapted to carry a head 14. The head 14 is formed with apertures 15 in which the rods 12 are received. Nuts 16 are threaded on the extremities of the rods 12, and serve to hold the head 14 securely in position. Compression springs 17 serve to keep the head 14 at a predetermined height above the frame 10, and also serve to return it to this position position after it has been forced downwardly.

A bolt 18 passes through the middle of the head 14 and is provided with a threaded section at its lower extremity which is received in a tapped hole 19, formed in an anvil 20. The lower portion of the anvil 20 is recessed at 20' to receive the container 21 and holds it in a fixed position during the filling and sealing operation. The container 21 is shaped in the form of a bulb and is carried in an inverted position by a carrier block 22 which may hold a plurality of containers for filling simultaneously. The carrier block 22 is adapted to slide on the guides 23 and 24, which are secured to the frame 10 of the apparatus. The notches 25 on the carrier block 22 cooperate with the slides 26, only one of which is shown, to lock the carrier block 22 securely in place for filling and sealing. A cam roller 27 is mounted on the outer extremity of each of the slides 26, which engages a cam 28, journaled at 29 to rotate

in the direction indicated by the arrow. The cam 28 acts to move the slide 26 into one of the notches 25, and it is returned to its initial position by the action of a spring 30, which is attached at one end to a pin 31 on the frame 10, and at the other end to a pin 32 on a boss 33 which is formed on the slide 26.

The lower ends of the rods 12 are secured in the arms of a U-shaped member 34 on which is mounted a cam roller 35. Between the arms of the U-shaped member is a shaft 36 on which are mounted three separate cam mechanisms 37, 38 and 39, which rotate in the direction indicated by the arrow.

The cam 38 is adapted to engage the cam roller 35 to force the member 34 downwardly and thus lower the anvil 20 down on the container 21.

The double acting cam 37 engages a cam roller 40 which is journaled on a shaft 41 formed on a ram 42, which is slidably mounted in the frame 10, directly below the anvil 20 and which serves to move the ram upwardly for the filling and sealing operations.

The cam 39 is adapted to engage a cam roller 43 which is mounted on an arm 44 of a bell-crank mechanism 45 pivoted at 46 on the frame 10. The other arm 47 of the bell-crank mechanism 45 engages the shaft 41 to lower the ram 42 after the sealing operation has been completed.

The ram 42 is formed with a passage 48 to which the high pressure fluid is fed from a tube 49. The upper end of the passage 48 terminates in a chamber 50, the top of which is threaded to receive a hexagonal nut 51, illustrated in Figure 6, which is formed with a chamber 52 in which a punch 53 is adapted to be received. The punch 53 preferably has a rectangularly shaped tip and is tapered at 54 to form a valve which controls the flow of gas to the container 21, in cooperation with a section of the chamber 52, which is tapered to form a valve seat 55. The upper surface of the punch 53 may be curved as shown in the drawings to provide a space between it and the neck through which gas under pressure may be supplied to the container. The top of the hexagonal nut 51 is provided with a circular recess 56 in which the neck of the container 21 is adapted to be snugly received, so that there will be no leakage of gas during the filling operation. As shown in Figure 5, the punch 53 is formed with grooves 55' to allow passage of the gas to the container 21.

The lower portion of the punch 53 is formed with a flange 57, which is adapted to fit snugly against the lower portion of the hexagonal nut 51, against which it is urged by a compression spring 58. The spring 58 is seated at 59 on a disc 60 in the bottom of the chamber 50. As illustrated in Figures 2, 3 and 4, the disc 60 is provided with the passages 61 through which gas may flow to the container 21.

At the beginning of the filling and sealing operation, the head 14 is in its highest position while the ram 42 is in its lowest position. A container carriage 22 is moved on the guides 23 and 24 into a position where the container 21 is directly over a ram 42. The cam 28 is then in a position to move the slide 26, against the compression of the spring 30 to engage the notch 25 and thus lock the container carriage 22 in position over the ram 42. The rotation of the cam 38 then acts to lower the head 14 until the container is received in the recess 20' in the anvil 20. At this point the rotation of the double acting cam 37 forces the ram upwardly until the neck of the container 21

is snugly received in the recess 56 in the hexagonal nut 51, as illustrated in Figure 2. In this position the punch is forced downwardly against the compression in the spring 58 until it rests on the disc 60, thus allowing gas to enter the container. After the container 21 has been properly charged with gas, the continued rotation of the cam 37 forces the ram 42 still further upwardly until the hexagonal nut 51 makes contact with the bottom surface of the container carriage 22, as illustrated in Figure 2. This motion forces the tip of the punch 52 into the center of the neck of the container 21, thus crowding the metal into the filling opening and closing it tightly. The operation causes the metal about the periphery of the neck to be stressed in tension so that the metal about the closure is stressed in compression, thus additionally aiding the closure.

The continued rotation of the shaft 36 causes the cam 39 to engage the cam roller 43 and thus actuate the bell-crank mechanism 45. The arm 47 of the bell-crank mechanism engages the shaft 41 and thus moves the ram 42 downwardly so that the punch is removed from the neck of the container 21, as illustrated in Figure 3. At the same time the cam 38 allows the head to rise upwardly, due to the force of compression in the springs 17, thus removing the anvil 20 from above the container 21, whereupon it is removed from the machine.

The finished container is illustrated in Figure 7, where the rectangularly shaped recess in the neck is clearly shown. It will be noted that the hole has lost its original shape, and all that remains is a linear seam on either side of which the metal is under compression. This form of closure functions to retain the medium effectively in the container and prevent escape thereof until it is to be used in the desired fashion.

The invention also provides a simple and improved method and apparatus whereby these superior containers may be conveniently filled with fluid and then sealed, in large quantities, so that the benefits of large scale production may be attained in their use.

While a specific embodiment of this invention has been described above, it is to be understood that it is to be in no way limited thereby, but is capable of modification in form and detail within the scope of the appended claims.

#### I claim:

1. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising means to position the container, means to charge the container with a fluid under pressure, and means for working the material adjacent the opening in the neck of the container into the filling opening forming a closure.

2. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising means to position the container, means to charge the container with a fluid under pressure, and a reciprocable punch to deform the material adjacent the opening in the central portion of the neck of the container to work it into the filling opening.

3. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, means to position the container over the frame, a reciprocable ram in the frame having means to charge

the container with a fluid under pressure, a punch in the ram to deform the material in the neck of the container and to crowd it into the filling opening, a portion of the punch forming a valve, and a seat in the ram for the said valve portion.

4. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, means to position the container over the frame, a reciprocable ram in the frame having means to charge the container with a fluid under pressure, a punch in the ram to deform the material in the neck of the container and to crowd it into the filling opening, a spring on the punch, a tapered portion on the punch forming a valve, and a portion in the ram forming a seat for the said valve portion.

5. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, means to position the container over the frame, a reciprocable ram in the frame, the ram having a chamber therein, a punch in the said chamber to deform the material in the central portion of the neck of the container to crowd it into the filling opening, a spring on the punch and seated in the said chamber, a tapered portion on the punch forming a valve, a portion in the ram forming a seat for the said valve portion, the said punch having therein a passage to permit the flow of fluid to the container, the said ram having therein a passage in communication with the said chamber, and means to supply a high pressure fluid to the said last passage whereby the container may be charged therewith.

6. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, a slidable carriage for the container, guide brackets on the frame for the said container carriage, a reciprocable anvil over the container carriage whereby vertical motion of the container during the filling and sealing operations is prevented, a reciprocable

cable ram having a chamber therein in the frame having means to charge the container with a fluid under pressure, and a punch in the ram to deform the material in the neck of the container to crowd it into the filling opening.

7. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, a slidable carriage for the container, guide brackets on the frame for the said container carriage, means to lock the said container carriage in position, a reciprocable anvil over the container carriage whereby vertical motion of the container during the filling and sealing operations is prevented, actuating means for the said anvil, a reciprocable ram in the frame having means associated therewith to charge the container with a fluid under pressure, actuating means for the ram, the latter having a chamber therein, and a punch in the ram to deform the material in the neck of the container to crowd it into the filling opening.

8. An apparatus for manufacturing containers for high pressure fluids, said containers having a narrow neck and an opening therein whereby they may be filled, comprising a frame, a slidable carriage for the container, guide brackets on the frame for the said container carriage, a reciprocable anvil over the container carriage whereby vertical motion of the container during the filling and sealing operations is prevented, a reciprocable ram in the frame, having a recess therein to receive the neck of the container, the ram having a chamber therein, a punch in the said chamber to deform the material in the central portion of the neck of the container to crowd it into the filling opening, a spring on the punch and seated in the said chamber, a tapered portion on the punch forming a valve, a portion in the ram forming a seat for the said valve portion, the said punch having therein a passage to permit the flow of fluid to the container, said ram having therein a passage in communication with the said chamber, and means to supply a high pressure fluid to the said passage whereby the container may be charged therewith.

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