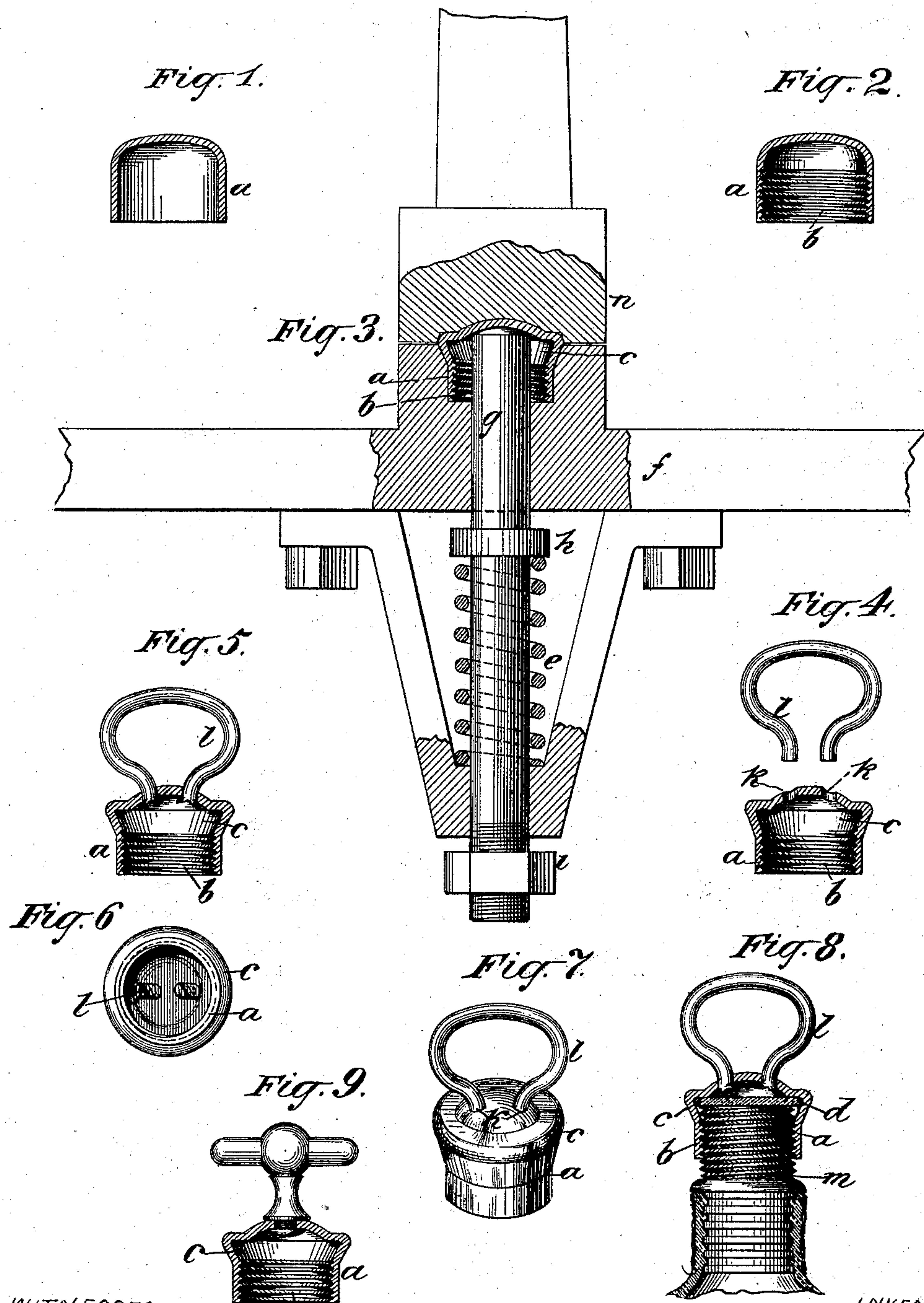


(Model.)

G. SCHRADER & J. SCHMITT.
PROCESS OF FORMING SCREW CAPS.

No. 406,479.

Patented July 9, 1889.



WITNESSES

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GEORGE SCHRADER, OF NEW YORK, AND JOSEPH SCHMITT, OF BROOKLYN,
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PROCESS OF FORMING SCREW-CAPS.

SPECIFICATION forming part of Letters Patent No. 406,479, dated July 9, 1889.

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To all whom it may concern:

Be it known that we, GEORGE SCHRADER, of New York city, New York, and JOSEPH SCHMITT, of Brooklyn, Kings county, New York, have jointly invented certain new and useful Improvements in the Process of Forming Screw-Caps for Bottles, Jars, and other Purposes, of which the following is a specification.

10 Our invention has been more especially designed for the manufacture of screw-caps to cover the screw-necks of rubber water-bottles; but it is equally applicable for screw-caps for many other purposes.

15 Heretofore such screw-caps have ordinarily been formed by casting, the cap and its projecting T-handle being cast in one piece, and the screw-thread being then cut in the casting by tapping, while the annular recess above the thread to receive the packing-disk is formed by a turning-tool. In a later method the cap has been stamped out of thin sheet metal with a slot in the top, into which a flat handle of sheet metal has been soldered, while 25 the screw-thread is cut in a separately-formed screw-ring which is soldered within the thin stamped cap, thus leaving a recess for the packing-disk above the ring in which said disk is socketed.

30 Now the aim of our invention is to manufacture such screw-caps much more rapidly and cheaply, to reduce the operations and number of parts therein, and render the cap stronger and more perfect for its purposes. 35 To these ends we stamp up the cap from thick sheet metal and cut a screw-thread directly therein, and we so swage or compress the cap as to have the threaded part of contracted size, with an annular enlargement or recess above the thread to form the socket for the packing-washer. We also form the handle of a loop of wire whose ends are inserted in two holes cut through the top of the cap and there riveted or otherwise secured.

45 Our invention therefore consists, mainly, in the features above outlined, whereby a very cheap, strong, and perfect cap is produced, as hereinafter fully set forth.

50 In the drawings annexed, Figure 1 represents a section of a cap in its first stage or when first stamped from sheet metal. Fig. 2

is a section at the second stage when it is tapped or screw-threaded. Fig. 3 gives a section of the cap and the dies at the third stage, in which the tapped cap is swaged or contracted to form the enlargement or recess 55 above the screw-thread. Fig. 4 shows the wire loop-handle and the cap perforated to receive the ends thereof. Fig. 5 shows the fifth stage, where the wire loop is riveted in the cap. Fig. 6 is an inverted plan of Fig. 5. Fig. 7 shows a perspective view of the finished cap. Fig. 8 gives a section of the finished cap screwed upon the neck of the water-bottle with the packing-washer in the socket of 65 the cap. Fig. 9 gives a section of a modification.

Referring now to the drawings, the process of manufacture will be easily understood. The caps *a* are first stamped up by suitable 70 dies out of thick sheet metal in the form shown in Fig. 1—that is, preferably in the form of plain cylindrical cup-shaped blanks with a rounded top—the method of and means for such stamping being well understood, and 75 therefore needs no description. In this cup-shaped blank is next cut a screw-thread *b*, by tapping or otherwise, as seen in Fig. 2, the edge of the cap being at the same time turned off true; but the thread does not extend into 80 the cap the full depth, a blank or unthreaded space being left near the top of the cap, as shown in Fig. 2. The threaded cap is next swaged in the dies shown in Fig. 3, so as to contract the threaded part, leaving the blank 85 or unthreaded part in the top wider than the threaded neck, and thus forming an annular recess or socket *c* to securely receive the packing-washer *d* when inserted therein, as in Fig. 8. 90

The construction of the dies for the swaging operation will be readily understood from Fig. 3—that is, the lower die *f* has a flaring opening or socket corresponding to the shape to be imparted to the cap, and from it rises a 95 strong spring-bolt or yielding anvil-pin *g*, which rises in the center of the cap and abuts against the top of the cap interiorly, as shown, while the upper die *n* has a slightly-concave recess which comes down upon and shapes 100 the top of the cap. When the dies are separated, the spring-pin *g* rises above the lower

die *f* by the action of its spring *e*, limited by the stop-collar *h* and nut *i*, and the plain threaded cap shown in Fig. 2 may then be placed between the dies on the top of the pin *g*, and when the dies are forced together the cap is instantly swaged to the desired shape between them, as seen in Fig. 3, the pin *g* yielding to the descent of the upper die *n*, as will be understood from Fig. 3. The threads in the plain cap in Fig. 2 are made sufficiently large to allow for the subsequent contraction in the third stage, (shown in Fig. 3,) so that after the threaded part has been contracted, as described, it will be a correct fit for the screw-neck for which it is adapted, as will be readily understood from Fig. 8. In thus swaging the unfinished cap or cup-shaped blank, the lower or neck portion is contracted, while the upper or dome-shaped portion is crushed downward and outward by the same operation sufficiently to just fill the dies and take the desired form, as shown, without the use of a filling to transmit the pressure to the interior walls of the blank.

After the contracted cap has been removed from the dies in Fig. 3, it is next perforated with two holes *k* on the top, equidistant on each side of the axial center, as seen in Fig. 4, and a handle-loop *l* is then formed of wire, preferably of a round section, as shown in Fig. 4, and the ends of this loop are inserted in the holes *k*, and there firmly secured by soldering, riveting, or other means, as fully shown in Figs. 5, 6, and 8.

We prefer to rivet the ends of the wire loop on the inside of the cap, as shown in Figs. 5 and 6, simply by diagonal nicks made by the blows of a swaging chisel or punch, as illustrated in said figures, which is a very simple and effective operation, and secures the loop most firmly to the cap. When the handle is thus secured to the cap, the cap appears exteriorly as in Fig. 7, and is finished or complete, it being only now necessary to embed or socket a packing-disk or washer *d* up in the annular recess or socket *c* in the top of the

cap, and the cap may now be screwed down tightly on the screw-neck *m* of the water-bottle, as shown in Fig. 8, and will form an air and water tight cover thereon, as will be readily comprehended.

It will be noted, on reference to Fig. 8, that the top of the cap is slightly domed at the center above the center of the washer, so that the riveted ends of the handle do not touch the washer, which thus bears marginally against the flat marginal portion of the cap, and thus insures an even regular bearing for the washer between the top of the cap and the edge of the screw-neck *m*, which insures a tight joint and prevents injury to the washer, as will be readily appreciated.

It may now be seen that this mode of manufacture presents many advantages, for it will be seen that it dispenses with the waste and cost due to casting, and it yet produces the caps in one piece of sheet metal with screw-thread and recess for washer without any waste of metal and by a few direct operations, which renders the manufacture much cheaper and the cap superior to what has heretofore obtained.

What we claim is—

The process of forming screw-caps herein described, which consists, first, in stamping a cylindrical cup-shape blank out of sheet metal; second, cutting a screw-thread therein, and, third, swaging between suitably-formed dies, so as to contract the lower or neck portion, while the upper or dome-shaped portion is crushed downward and expanded outward by the same operation sufficiently to just fill the dies and take the desired form, as shown, without the use of a filling to transmit the pressure to the interior walls of the blank, substantially as shown and described.

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