Nov. 30, 1948. L. J. KALWO 2,454,927

KNOB CONSTRUCTION FOR LOCKS

Filed Feb. 2, 1945

Fig. 1.

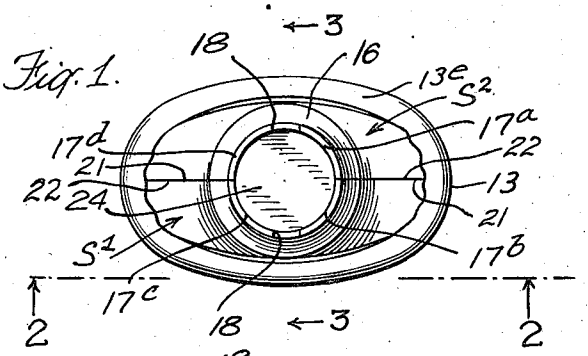
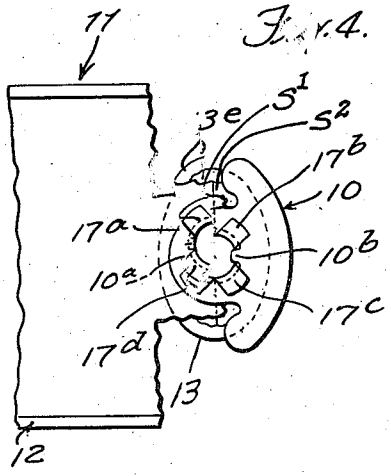


Fig. 4.



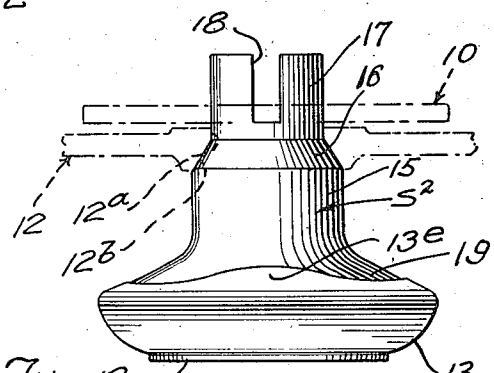
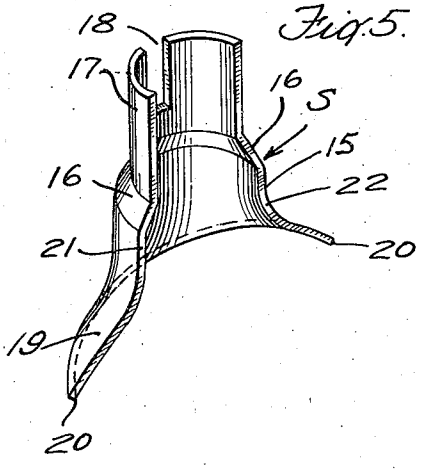


Fig. 2.

Fig. 5.



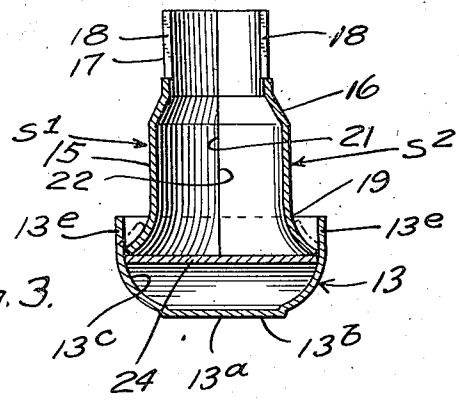
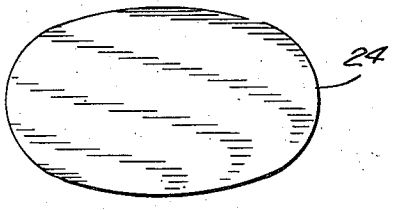


Fig. 3.

Fig. 6.



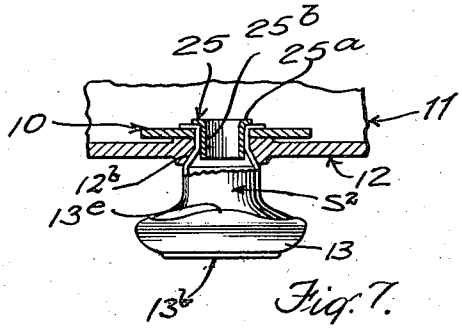


Fig. 7.

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KNOB CONSTRUCTION FOR LOCKS

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5 Claims. (Cl. 292—347)

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This invention relates to a knob construction for door locks and the like.

One of the objects of this invention is to provide a knob construction that will be inexpensive to fabricate, easy to assemble to the operating part of a lock mechanism, and be strong and durable. Another object is to provide a knob construction of sheet metal that will be capable of manufacture by way of simple and inexpensive operations, easy to assemble, and yet have the strength, durability, and appearance of a knob construction fabricated according to prior known, expensive, sheet-metal drawing operations. Another object is to simplify the construction of lock knobs and their assembly to the operating member of a lock. Another object is to provide a construction of the above-mentioned character, in the fabrication of which simple and inexpensive punch-press operations may be utilized. Another object is to provide a practical method for fabricating a lock knob construction that may be efficiently and economically carried on in practice. Another object is to provide a method of the just-mentioned character in which finishing operations including milling, can be dependably eliminated. Other objects will be in part obvious or in part pointed out hereinafter.

The invention, accordingly, consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are shown, by way of illustration, the mechanical features of a preferred embodiment of my invention:

Fig. 1 is a bottom elevation of the completed lock knob, ready for assembly to the parts of a lock casing;

Fig. 2 is a front elevation thereof as shown along the line 2—2 of Fig. 1;

Fig. 3 is a central, vertical, sectional view as seen along the lines 3—3 of Figs. 1 and 2;

Fig. 4 is a fragmentary elevation of a lock casing, largely broken away and with parts omitted, in order better to show the relationship of assembly between the knob and the bolt-operating member of the lock;

Fig. 5 is a perspective view of one of several parts that make up the side or shank portion of the knob;

Fig. 6 is an elevation of a flat plate that is preferably employed in the knob construction; and

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Fig. 7 is a central, vertical, sectional view showing the relationship of the parts when assembled to the lock casing and lock mechanism, and showing also an additionally assembly element which may be optionally employed.

As conducive to a clearer understanding of certain features of my invention, reference may first be made to Fig. 4 and also to the fact that lock casings, particularly in locks of the "rim" type, are provided with a knob so that the bolt may be actuated manually from the inside of the door as distinguished from actuating the bolt by way of a key from the outside of the door, and that such knobs are rotatably mounted in a wall of the lock casing and have internally secured to them a bolt-controlling or bolt-operating member, which may take any desired or suitable form and which, in one suitable form, is shown in Fig. 4 and designated by the reference character 10; of the lock casing 11, only a portion of the wall 12 is shown in Fig. 4, that being the wall by which the knob is to be rotatably carried. The bolt and its mechanism that coacts with the member 10, hereinafter referred to as a "cam member," may take any suitable form and are not shown. According to prior practices, such knobs, the handle portions of which are usually elongated or oval, have been manufactured out of a single piece of sheet metal by successive steps which comprise drawing and annealing operations, followed by finishing operations of various kinds, including the milling of a slot in a side wall of the tubular shank portion, into which is to be received a key-like member or lug of the cam member so that the latter may be non-rotatably engaged by the knob shank. These operations are long, drawn-out, and costly, and a dominant aim of this invention is to produce a better knob by steps which avoid such costly operations as those above noted.

Accordingly, I provide a number of sheet metal parts so constructed that they may be readily and inexpensively produced by simple punch-press operations. Thus I provide a cap member 13, which is preferably oval in general configuration, having usually a flat central area 13a, usually also oval in shape, and which, by the same punch-press and die operation, may have impressed in its surface suitable lettering or a suitable design, thus to function as a manufacturer's nameplate or as ornamentation, as is indicated at 13b, and from this flat portion or area 13a the sheet metal stamping is formed, by suitable curvatures, as are better shown in Fig. 3, that being a section along the minor axis, to present an internal curved surface

or portion 13c that merges into the upstanding or vertical peripherally-extending flange 13e.

By suitable dies, operable again in inexpensive and speedy punch-press operation, I form out of sheet metal several side sections, all preferably constructed and shaped to be identical, and in Fig. 5 one of such side sections is shown in perspective, where the shank and bearing portions of the knob are, in accordance with my invention, to be made up of two separate pieces or sections, that number being more suitable where the cap portion is to be oval and, hence, it will be understood that making up the side portion of the knob out of two separate sections is set forth as illustrative and that any number other than two may be employed within the spirit and scope of my invention. The side section shown in Fig. 5, and generally indicated by the reference character S, is stamped and shaped out of a suitable blank to provide a half-cylindrical shank portion 15, which merges inwardly to form a frusto-conical portion 16, which in turn terminates in a half-cylindrical portion 17 which at its midpoint peripherally has cut or stamped out of it enough metal to form a slot 18 that extends part-way of the length of the half-cylindrical portion 17; at its lower terminus the half-cylindrical shank portion merges outwardly and downwardly, in suitably graceful curves, to form the portion 19, which, however, has its peripheral edge 20 shaped to conform to half of the oval or ellipse, divided along the axis that is defined substantially at the junction of the curved internal face 13c (see Fig. 3) of the cap member 13 with the straight or vertical, internal, oval wall of the flange 13e. The portions 20, 19, 15, 16, and 17 each subtend an angle of 180 degrees where the side or shank portion of the knob is to be made of two pieces, as in the illustration; these portions are all coaxial, and the edge face 20 at one end preferably extends at right angles to the common axis. The edge faces 21 and 22 of the part S preferably fall in a plane in which lies also the common axis of the various portions.

For quality production, any desired large number of such sections S may thus be inexpensively and economically made in simple punch-press operations, and any two of such parts S complement each other and can be abutted one against the other, with the vertical edge 22 of each matching and engaging the vertical edge 21 of the other. In determining, therefore, into how many pieces the side part of the knob is to be made up of, the theoretical or ultimate whole shank portion is preferably divided along planes of symmetry so that the same dies produce identical or complemental parts.

In the illustrative embodiment, two parts S^1 and S^2 are placed together, with the vertical edge face 22 of the one engaging and matching the edge face 21 of the other, and, as a unit, they are set downwardly into the stamped cap member 13 (see Fig. 3), entering the latter to an extent limited by the downwardly and inwardly curved surface 13c, which, being oval in horizontal cross-section—though variable, according to where the horizontal section is taken—will always somewhere match the complete oval that is made up by the two bottom edges 20 of the two assembled side sections S, thus also aiding in preventing relative vertical displacement between the two temporarily assembled side sections S^1 and S^2 of Fig. 3, whence the flange 13e may be peripherally bent over and inwardly onto the downwardly and outwardly flaring, lower peripheral part of the portion 19.

Preferably, however, I first insert into the cap member 13 a flat, oval plate 24 (see also Fig. 6), which is a simple, flat stamping having an oval periphery relatively accurately matching the oval periphery which the two lower edges 20 of the sections S^1 and S^2 define when they are put together, and in Fig. 3 this preferred insertion of the plate 24 is shown. The plate 24 thus forms a flat, rigid seat upon which to receive the two edges 20, 20 of the parts S^1 and S^2, plate 24 itself being receivable into the cap 13 to a suitable depth, preferably limited, as above indicated, by that portion of the curved surface 13c where it merges into the vertical flange 13e. The plate 24 can, in effect, under the subsequent forces applied, somewhat wedge itself into the cap 13 and always provide a flat seat for the portions S^1 and S^2 so that they do not become misaligned vertically, and, by this preferred use of the plate 24, possible variations or imperfections, particularly in the curvatures of the cap 13, can be prevented from tending to misalign the sections S^1 and S^2, as might be the case if their respective lower edge portions were directly to engage the curved surface portions of the cap 13.

With the parts assembled as shown in Fig. 3 and all held coaxially, the flange 13e is forced inwardly and downwardly against the downwardly and outwardly curved portions of the portion 19 of the assembled parts S^1 and S^2, the flanging-over being preferably carried throughout the entire oval, peripheral extent of the assembled parts, as is indicated in Figs. 1, 2, and 4, where the flange 13e is shown in substantially its final position. During this operation the plate 24 not only aids in preventing relative vertical misalignment between the parts S^1 and S^2, but also forms practically an anvil against which the lower flaring portions of the sections S^1 and S^2 are clamped by the flange 13e, and the plate 24 aids in preventing undesired distortion of the parts during this clamping operation, particularly where relatively light-weight sheet metals are employed.

The above-described clamping action is also, throughout the flange 13e, in a radially inward direction, thus in effect not only clamping and holding the two parts S^1 and S^2 tightly together, but also neatly centering the assembled parts S^1 and S^2 with respect to the cap 13. A dependable junction of the two separate parts S^1 and S^2 is effected with the cap element 13, and a dependably strong unitary assembly results.

The coaction of the parts in effecting the above-described clamping action thus results in a single light but strong structure, in which the two shank portions 15 of the two side portions are neatly matched together, giving the appearance of a neat external cylindrical surface except for the perceptible vertical abutting junctions along the mating vertical edges 21, 22, and in a similar manner the two conical portions 16, each of 180 degrees extent, and the half-cylindrical portions 17 complement each other and present neat and smooth external frusto-conical and cylindrical surfaces of 360 degrees extent and of true roundness, suitable to form bearing surfaces for mounting in the lock casing; these surfaces are interrupted only by the vertical and minute crevices formed by the abutting vertical edges 21—22. As better seen in Figs. 1, 2, and 3, the bearing portion 17—17 also has diametrically opposed slots 18—18, and, with the above-mentioned vertical crevices or planes of cleavage, the upper end of the bearing portion 17—17 is divided into four segments, indicated in Fig. 1 at 17a, 17b, 17c, and

17d. The device is now ready to be assembled to the lock mechanism and casing.

The front wall 12 of the lock casing 11, as is indicated in the broken lines in Fig. 2, is provided with a hole 12a to take the bearing portion 17—17, and the hole is provided with a countersink 12b at an angle substantially to receive therein the frusto-conical portion 16—16. When so related to the casing wall 12, a substantial portion of the bearing part 17—17, including the opposed slots 18—18, projects beyond the inner face of the wall 12, and it is onto this portion that the cam 10 is then sleeved or slipped, the cam 10 having a hole 10a to receive that portion and having at least one lug 10b projecting radially inwardly from the wall of the hole 10a; the lug 10b is receivable into one of the slots 18, functioning with the latter as a key and keyway, and preferably also serving, by bottoming in the vertical slot 18, as a stop to limit the extent to which the cam 10—indicated in broken lines in Fig. 2—approaches the inside face of the casing wall 12. Thereupon the short lengths (see Fig. 2) of the segments 17a, 17b, 17c, and 17d that project above the cam member 10 are, by a suitable tool, bent or spun radially outwardly into the general relationship shown in Fig. 4, and against the upper face of the cam member 10, thus rigidly securing the latter to the knob structure. This bending-over operation is facilitated in that several (four, in the illustrative embodiment) parts of the protruding bearing portion are available for greater ease of being bent over into clamping engagement with the member 10. The latter, moreover, is in non-rotatable engagement with the knob structure, due to the coaction of the lug 10b with the slot 18, and the latter parts also insure that the oval-shaped knob and the cam 10 are assembled in the desired relation, as indicated in Fig. 4, the cam 10 being in a position corresponding to the "at rest" position from which, by turning the external knob in either direction, the cam 10 is in turn turned to actuate the bolt mechanism.

Not only is the cam 10 thus dependably assembled to the built-up knob structure, but also the cam in effect completes the assembly of the elements of the knob structure itself, in that the hub portion of the cam 10, snugly clamped by the overturned elements 17a, 17b, 17c, and 17d, thus functions as a strong collar above the extreme end portion of the complemental bearing parts 17—17 to hold the parts S^1 and S^2 tightly together at end thereof remote from the cap element 13.

In such assembly the upstanding parts, illustratively four in number—out of which the overturned elements 17a, 17b, 17c, and 17d are formed—substantially mutually sustain each other, at their adjacent vertical contacting faces, against radial inward movement, their arcuate or curved horizontal cross-sections giving them good rigidity and resistance against bending radially either outwardly or inwardly, and the key portion or portions—such as the lug 10b, at the cam 10—can take part in such coactions.

If desired, and after completion of the assembly as the latter is shown in Fig. 4—and particularly where the cam may be provided with only one key lug—I may insert a cylindrical element 25, as shown in Fig. 7, into the round or cylindrical open end of the assembled knob construction, preferably proportioning the member 25 so it may be entered with a relatively tight, friction fit and thereby also hold itself in assembled position, and it may be provided externally with a flange or lip 25a to limit the extent of its entry, and preferably also to overlie the overturned parts 17a, 17b, 17c, and 17d and thus also resist unbending of the latter.

The member 25 thus supplements the above-described resistance of the upstanding parts of the hub portion to radial inward movement and may coact with the cam 10 to clamp these parts radially therebetween. It preferably has a hole 25b extending therethrough to accommodate, when necessary, the projecting portion of the key bar that usually extends from the key mechanism to another cam companion to and coaxial with the cam 10, and thus does not interfere with that function of the open-ended knob structure. Member 25 may be made up in any suitable way and may be also of sheet metal. In making it hollow, it also has some resiliency when pressed home and thus can better coact to hold itself in position.

It will thus be seen that there has been provided in this invention a lock knob construction and method of making it and assembling it to the lock structure, in which the various objects hereinbefore noted, together with many thoroughly practical advantages, are successfully achieved. The individual parts are of simple and inexpensive fabrication, assembly thereof may be effected by simple and inexpensive operations, including also the step of completing the assembly of the knob parts by securing thereto the cam elements of the lock construction. Moreover, it is possible to avoid certain heretofore necessary finishing operations, such as the step of milling a slot to receive the lug 10b of the cam, since I am enabled to form a slot by a simple punch-press operation and, where desired, I may, in view of the complemental slots 18—18, also provide the cam member with two diametrically opposed lugs, one for each slot, thus to achieve also a nicely balanced assembly of cam to knob shank, particularly where the lug is to bottom in the slot and to be clamped thereagainst by the overturned end portions of the knob shank.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, and it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A knob construction which is oval at the hand gripping end comprising a plurality of independent identical sheet-metal stampings, complemental along their longitudinal axes to each other, bent to an arcuate, semi-tubular shape, said stampings having abutting side edges and forming, when assembled, a hollow shank which at one end is circular in cross-section, the end edges at the other end falling in substantially a single plane, and a cap element at said last mentioned end having a peripheral flange portion encasing said end edges of said stampings and by which said stampings are held against separation from each other and against relative axial displacement.

2. A knob construction which is oval at the hand gripping end comprising a plurality of independent identical sheet-metal stampings, complemental along their longitudinal axes to each other, bent to an arcuate, semi-tubular shape, said stampings having rectilinear, abutting side edges and forming, when assembled, a hollow

shank which at one end is circular in cross-section, the end edges at the other end falling in substantially a single plane, and a cap element at said last mentioned end having a peripheral flange portion encasing said end edges of said stampings and by which said stampings are held against separation from each other and against relative axial displacement, said cap element having means falling in a single plane to form a seat against which said end edges of said stampings are aligned and against which they are held by said peripheral flange portion.

3. A knob construction as claimed in claim 2, in which said cap element has internal concave walls and in which said seat-forming means comprises a plate member of oval contour resting against said concave walls and having said end edges seated against its exposed face.

4. A knob construction for latches which is formed with a hand gripping end and a trunnioned end comprising a plurality of independent, identical sheet metal stampings complemental to each other along their longitudinal axes, bent to an arcuate, semi-tubular shape, said stampings having abutting side edges and forming, when assembled, a hollow shank which, at one end, is tubularly formed in cross section, the end edges at the other end falling in substantially a single plane, and a cap element on said last mentioned end having a peripheral flange portion encasing said end edges of said stampings and by which said stampings are held against separation from each other and against relative axial displacement.

5. A knob construction for latches which has a hand gripping end and a bearing end comprising a plurality of independent, identical sheet metal stampings complemental to each other

along their longitudinal axes, bent to an arcuate, semi-tubular shape, said stampings having abutting side edges and forming, when assembled, a hollow shank which at one end is tubular in cross section, the end edges at the other end falling in substantially a single plane, and a cap element on said last mentioned end having a peripheral flange portion encasing said end edges of said stampings and by which said stampings are held against separation from each other and against relative displacement, and a collar engaging the shank adjacent the first end and cooperating with the cap element to restrain separation in rotation in the bearing.

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Certificate of Correction

Patent No. 2,454,927. November 30, 1948.

LUDWIG J. KALWO

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 44, for the word "quality" read *quantity*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of April, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.