Dec. 17, 1940. S. BRANTINGSON 2,225,545

LOCK CONSTRUCTION

Filed July 6, 1939

Fig. 1.

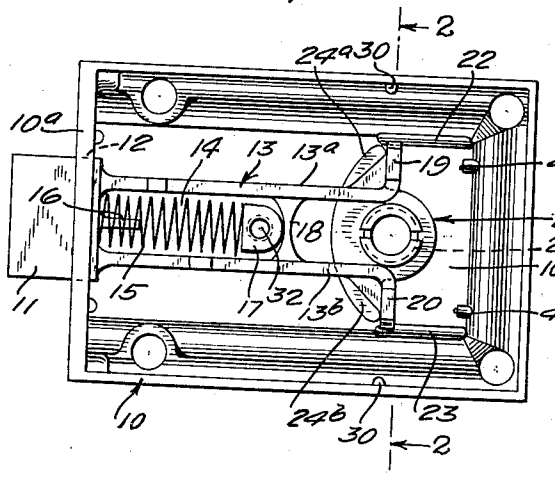


Fig. 2.

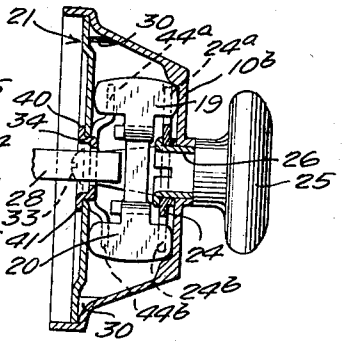


Fig. 3.

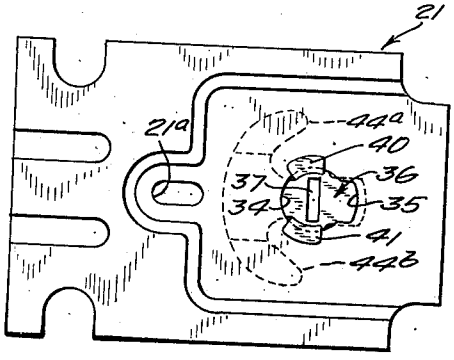
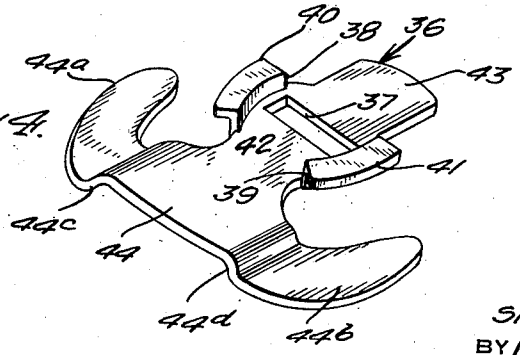


Fig. 4.



INVENTOR
SIGURD BRANTINGSON
BY William T. Kniesner
ATTORNEY

Patented Dec. 17, 1940 2,225,545

UNITED STATES PATENT OFFICE

2,225,545

LOCK CONSTRUCTION

Sigurd Brantingson, Palisades Park, N. J., assignor to Francis Keil & Son, Inc., a corporation of New York

Application July 6, 1939, Serial No. 282,983

4 Claims. (Cl. 292—169)

This invention relates to lock construction.

One of the objects of this invention is to provide a simple, inexpensive and thoroughly practical lock construction of the bolt type that will be capable of facility of manufacture and ease and speed of assembly. Another object is to provide a construction of the above-mentioned character in which assembly may be maintained dependably but in a simple and inexpensive manner, without detracting from durability and strength of construction or from dependability of operation. Another object is to provide, in a lock construction of the above-mentioned character, an operating lever or cam of simple and dependable construction, capable of low cost of manufacture, and ease and high efficiency of assembly to its supporting part, usually the back plate of the lock construction. Another object is to provide a back plate and cam or lever structure, for locks of the above-mentioned general character, that will be simple and inexpensive to fabricate, and easy to assemble to form a sub-assembly of a character capable of ease of assembly to the lock construction itself and preferably in a manner to maintain the sub-assembly intact. Another object is in general to improve upon the construction and to lessen the cost of production of lock construction of the above-mentioned character. 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, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of the various possible embodiments of my invention,

Figure 1 is a rear plan view of a form of lock construction with the back plate and parts related to the latter removed;

Figure 2 is a vertical sectional view as seen along the line 2—2 of Figure 1 but showing the back plate and its related part or parts in assembled and operative relation to the bolt and other bolt-operating mechanism of the lock construction;

Figure 3 is a rear plan view of the sub-assembly of back plate and operating cam or lever, showing its relationship when ready to be assembled to the structure of Figure 1; and

Figure 4 is a perspective view on an enlarged scale of the operating cam or lever.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring first to Figures 1 and 2, I have shown at 10 an illustrative form of casing having suitably supported therein for movement into or out of "locked" position a suitable form of bolt which, illustratively, may take the form of a latch bolt; insofar as certain features of my invention are concerned, the casing and bolt construction may take any suitable form. Illustratively, the bolt may comprise a suitable head 11 projectable through a suitable opening 12 in end wall 10a of the casing, the interior part of the bolt having a shank 13 which is preferably formed to be hollow or slotted as at 14; slot 14 is of sufficient length so that the bolt head 11 is in its normal projected position (as shown in Figure 1) when a helical spring 15, having its left-hand end received over an inwardly projecting stud 16 on the bolt head 11 and having its right-hand end abutting against a casing post 17, is allowed sufficient freedom of action under the control of cams or levers later described. The right-hand end wall 18 of the slot 14 preferably does not, normally, engage the post 17, but engagement of parts 18 and 17 under some circumstances may limit the extreme possible action of the spring 15 and likewise limit the maximum extent to which the spring may project the bolt 11 outwardly of the casing 10, particularly during assembly.

In a direction to the right of the end wall portion 18 of the bolt shank 13, the latter is preferably bifurcated as at 13a and 13b, terminating in two cross-bar members 19 and 20 spaced to either side of the longitudinal axis of the bolt and each being, in a direction transversely of the casing and as is better shown in Figure 2, of a length just about equal to the inside dimension of the casing 10 when its back plate 21 is ultimately assembled in closing position in the otherwise open rear end of the casing 10.

The cross bars 19—20, which may be integrally formed with the bolt shank 13, may thus coact with the front wall 10b and the back plate 21 of the casing 10 in holding and guiding the bolt in its intended path of movement as it is withdrawn into the casing or projected out of it, front wall 10b being provided with suitable spaced ribs 22—23 upon its inside face and between which the ends of the cross bars 19—20 are received for guiding coaction therewith, as is clear from Figures 1 and 2.

Thereby also the cross bars 19—20 become mounted and positioned for coaction with suitable actuating levers or cams which, for purposes

of illustration, comprise a cam 24 rotatably mounted in the front wall 10b of the casing 10 to be actuated usually by a hand knob 25, the latter having a sleeve-like extension 26 that passes rotatably through a suitably formed opening in the front 10b and has its innermost end extended through and non-rotatively secured into a suitably shaped hole 27 in the cam 24, the latter being bifurcated and hence having two arms 24a and 24b, which extend into engagement with the left-hand faces (as viewed in Figure 1) of the cross bars 19—20 respectively, the latter being held in engagement with the former, under normal conditions, under the action of the spring 15, which thus also, through the balanced action of the two spaced cross bars 19—20 upon the arms 24a and 24b of the cam holds the latter and the knob 25 in its normal position corresponding to the normal projected position of the bolt head 11.

Having assembled the knob 25 and cam 24 to the casing 10, bolt structure 11—13 is simply inserted into proper position and spring 15 interposed as above described, the assemblage thus far being now ready to receive the back plate 21 which carries rotatively an operating lever or cam structure usually intended for quick interrelationship with the operating bar 28 of a key-controlled mechanism (not shown) of any suitable character.

Back plate 21 is preferably made up in the form of a sheet-metal stamping of suitable configuration and strength, being preferably shaped, in outline, to be received snugly within the end portions of the side and end walls of casing 10, and against suitable shoulders 30 (Figures 1 and 2) suitably formed in the casing walls and suitably distributed thereabout; in this connection the end face of the post 17, the latter being preferably integrally formed with the front wall 10b, also acts as such a shoulder, all of the shoulders falling in the plane in which it is desired to have the inner face of the back plate 21 fall when assembled to the casing, thus to insure proper spacing between back plate 21 and front wall 10b for sufficient freedom of guiding movement therebetween of the cross bars 19—20 as the bolt structure 11—13 is reciprocated along its line of movement. The post 17 is preferably provided with a threaded hole 32 with which a slot 21a (Figure 3) registers when the back plate 21 is in closing position and to receive a screw 33 (Figure 2) to hold the back plate assembled to the casing.

Back plate 21, in the above-described position of assembly, is provided with a round hole 34 (Figure 3) whose axis is coincident with the axis of rotation of the cam 24 above described, and hole 34 has an extension 35 which is in general of substantially rectangular shape and is preferably positioned in line with the line of movement of the bolt structure 11—13. The arcuate walls of the hole 34 are to form the bearing surfaces for rotatably supporting the cam or lever structure 36 which is to receive the operating bar 28 for actuation thereby and which coacts with the other structural parts to control the bolt structure 11—13.

The cam or lever structure 36 is preferably constructed of suitably heavy sheet metal and preferably in such a way as to bring about its quick and easy assembly to the back plate 21 and with respect to the round hole 34; for these purposes the extension 35 (Figure 3) of the hole 34 takes part in certain coactions.

The cam structure 36 is better shown in Figure 4, being provided with a hole 37, usually rectangular, to receive freely therein the operating bar 28 (Figure 2) and adjacent to opposite ends of the hole 37 the sheet metal of the part 36 is turned upwardly as at 38 and 39, the parts 38 and 39 being preferably curved or arcuate with their external faces having a radius of curvature slightly less than the radius of curvature of the walls of the hole 34 so that the former may be received in the latter for rotary movement of the member 36 relative to the back plate 21. The upper ends of the arcuate bearing portions 38—39 are flanged over as at 40 and 41 at such a point that the spacing between the plane of the under faces of the flanges 40—41 and the plane of the upper face of the main body portion 42 of the sheet metal member 36 is slightly greater in dimension than the thickness of the back plate 21, as better appears in Figure 2.

The arcuate extent of the parts 38—40 and 39—41 is slightly less than the arcuate extent or dimension of the extension 35 (Figure 3) of the hole 34, so that either flange 40 or flange 41 may be freely entered into or through the hole extension 35, the radii to the outer edges of the flanges 40 and 41 being less than the radius to the right-hand vertical wall or edge, as seen in Figure 3, of the extension or slot 35.

As is better shown in Figures 3 and 4 the flanges 40 and 41 are preferably juxtaposed to each other and preferably the angular spacing of their respective center lines or middle radii is somewhat less than 180°; positioned along the line bisecting their angle of spacing is an extension 43 of the main body portion 42 and in the same plane as the latter. This extension 43, as is better shown in Figure 3, is of an arcuate extent greater than that of the slot extension 35 of the hole 34 and in a radial direction is also of greater extent than the slot extension 35. Along the same line, which may be considered the longitudinal center line of the device 36, but to the other side of the main body portion 42, the latter is extended as at 44 and again preferably in the plane of the main body portion 42. The extension 44 is, like the cam 24 (Figure 1), provided with two arms 44a and 44b substantially similar to the arms 24a and 24b. Preferably arms 44a and 44b are displaced from the plane of the main body portion 42 (Figures 2 and 4) and that may be accomplished by the steps or bends 44c and 44d.

Cam device 36 and the back plate 21 may now be assembled. First the device 36 is positioned to the under side of the plate 21 (see Figure 3) but in a position rotated 90° from that indicated in Figure 3. One of the flanges 40 or 41 may now be entered through the round hole 34 to bring its under face on to the upper face of the back plate 21 at a point approximately opposite the slot extension 35 of the hole, thus bringing the opposite flange 41 or 40 (as the case may be) underneath but in alinement with the slot extension 35, whence it may be entered through the latter to bring its under face at or above the plane of the upper face of the back plate 21. The device 36 is now given a suitable degree of rotation, for example, to the position shown in Figure 3, whence the arcuate portions 38—39 and the arcuate wall of the hole 34 coact in maintaining the device 36 co-axially with the axis of hole 34 during rotary movements, while displacement of the device 36 in the direction of its axis of rotation is prevented because the flanges 40—41 overlap one face of the back plate 21 and the main

body portion 42, or the extensions 43 and 44 thereof, or both, overlap the opposite face of the back plate 21; this relationship is maintained as long as the cam device 36 is not swung into a position to bring either of the flanges 40—41 into coincidence with the slot extension 35, but it will be noted that, particularly because of the angular spacing of the parts 40—41, as above described, a very substantial and, for practical purposes, entirely adequate rotation of the cam device 36 in either direction may take place.

The back plate 21 with the cam device 36 thus assembled to it is now assembled to the rear open end of the casing 10 in the manner above described, the cam device 36 during the operation of assembly, being held or positioned substantially in the relation shown in Figure 3, so that its arms 44a and 44b enter just to the left of the cross bars 19—20 as viewed in Figure 1, becoming thereby related to the cross bars in much the same way as are the arms 24a and 24b of the cam member 24. With the back plate 21 secured in position, as by the screw 33, the structure is ready for installation.

With the assembly thus completed, a rotary movement of the cam member 36 into a position such as would bring either of the flanges 40 or 41 into registry with the slot extension 35 is reliably precluded. The spring 15, acting normally to hold the bolt structure 11—13 in projected position as shown in Figure 1, insures that the cross bars 19 and 20, respectively engaging the arms 44a and 44b of the cam device 36, hold the latter in the position shown in Figure 3.

Should the cam 24 be actuated, as by the hand knob 25, so as to withdraw the bolt head 11, the movement of cross bars 19—20 toward the right, as viewed in Figure 1, is preferably limited, as by stops 45 (Figure 1) formed in the casing 10, to correspond to a position where the bolt head 11 is just free from any projection out of the casing 10; during such an actuation, the key-control mechanism (not shown) to which the operating bar 28 is connected, holds the latter against rotary movement and thus the cam device 36 continues to be held in the position shown in Figure 3, so that accidental dis-assembly of it from the back plate 21 cannot take place. But even assuming that the cam device 36 were to be free to rotate under these circumstances, the rotary movement thereof in either direction could be no more than is necessary to bring either of the arms 44a and 44b into engagement with its corresponding cross bar 19 or 20, but that would correspond to the extreme rotary movement of which the device 36 is capable under the control of the key mechanism were the latter to be operated to withdraw the bolt, but that degree of rotation is again insufficient to bring either of the flanges 40 or 41 into registry with the slot extension 35. Thus the bolt mechanism itself and coacting parts insure that, by such coactions as those noted above, accidental dis-assembly of the cam device 36 from the back plate cannot take place during handling, installation, or operation of the mechanism either by the key-control means or by the hand knob 25.

The device 36 furthermore is, in the preferred form, unitary or integral throughout, and thus has greater strength and security while at the same time the operations of assembly to the back plate are very greatly simplified and cost of production lessened. Also the device 36 and the back plate are easy and inexpensive to fabricate, and both have the advantage of being capable of fabrication by way of punch-press operations.

Thus it will be seen that there has been provided in this invention a construction in which the various objects above noted together with many thoroughly practical advantages are successfully achieved.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A sub-assembly for a lock construction having a lock casing and a movable bolt therein with cam-engaging means, comprising a plate attachable to said casing to close the latter and an operating cam, said plate having an aperture providing an arcuate bearing portion and at least one extension beyond the radius of curvature of said arcuate portion, said operating cam comprising a sheet-metal stamping having a portion substantially flat engaging the inside face of said plate, said portion having cam extension means for engagement with said cam-engaging means, said stamping having portions drawn out of the plane thereof and at substantially right angles thereto and forming arcuate flange means for rotary bearing contact with said arcuate portion of said aperture and said drawn portions being, at the ends of said arcuate flange means formed thereby, bent outwardly into substantial parallelism with said substantially flat portion thereby forming flange means overlapping the rear face of said plate, said arcuate flange means being of an extent sufficient to space said portion and said second-mentioned flange means by a distance to accommodate between the latter the thickness of said plate and said flange means being shaped to pass through said aperture extension upon giving said operating cam a certain rotary position relative to said plate.

2. A sub-assembly for a lock having a lock casing and a movable bolt therein, comprising a plate attachable to the casing and a bolt-operating cam, said plate having an aperture providing an arcuate bearing portion and at least one extension beyond the radius of curvature of said arcuate portion, said operating cam comprising a sheet metal stamping having an elongated main body portion to rest against one face of said plate with two opposed upstanding arcuate flanges at the respective sides of the longitudinal axis of said elongated main body portion and said flanges having externally a radius of curvature substantially the same as the radius of curvature of said arcuate bearing portion of said aperture and of an axial extent substantially the same as the thickness of said plate and having extending laterally and outwardly therefrom and alined transversely of the longitudinal axis of said elongated main body portion retaining flanges for overlapping the other face of said plate on opposed sides of said arcuate bearing portion of said aperture, said upstanding flanges with their respective retaining flanges being formed out of portions of the sheet metal of said stamping that extend respectively from opposed side edges of said elongated main body portion and on respective sides of said longitudinal axis, said extension of said aperture being dimensioned to permit the passage therethrough of at least one of said retaining flanges when said cam is swung to bring the one retain-

ing flange into registry with said aperture extension, whereby assembly or disassembly of said operating cam and plate may be effected.

3. A sub-assembly for a lock having a lock casing and a movable bolt therein, comprising a plate attachable to the casing and a bolt-operating cam, said plate having an aperture providing an arcuate bearing portion and at least one extension beyond the radius of curvature of said arcuate portion, said operating cam comprising a sheet metal stamping having an elongated main body portion to rest against one face of said plate with two opposed upstanding arcuate flanges having externally a radius of curvature substantially the same as the radius of curvature of said arcuate bearing portion of said aperture and of an axial extent substantially the same as the thickness of said plate and having extending laterally and outwardly therefrom retaining flanges for overlapping the other face of said plate on opposed sides of said arcuate bearing portion of said aperture, said extension of said aperture being dimensioned to permit the passage therethrough of at least one of said retaining flanges when said cam is swung to bring the one retaining flange into registry with said aperture extension, whereby assembly or disassembly of said operating cam and plate may be effected, said opposed arcuate flanges being positioned substantially midway between the ends of said elongated main body portion, thereby providing two opposed end portions one of which carries bolt-engaging cam means and both of which are dimensioned so that neither, if brought into position to overlap said aperture extension, can pass through the latter.

4. In a lock construction that has a lock casing and a movable bolt therein with cam-engaging means, the combination with a plate forming part of said lock casing and having an aperture for rotatably supporting an operating cam, of an operating cam comprising a flat main body portion engaging the inside face of said plate and having spaced from said main body portion by substantially the thickness of said plate two substantially diametrically opposed flange portions to rest against the outside face of said plate and to overlap the latter on opposed sides of said aperture, said two opposed flange portions being joined to said flat main body portion by two opposed substantially arcuate portions accommodated within said aperture for bearing engagement therewith and being of an axial extent substantially the same as the thickness of said plate, said aperture in said plate having an extension of sufficient extent in a circumferential direction to accommodate therethrough the circumferential dimension of one of said flange portions and of a radial extent sufficient to pass said one flange portion therethrough when the arcuate portion of the other flange portion is in bearing engagement with said aperture and the fit of said bearing engagement being relatively loose to permit canting of said operating cam relative to said plate when said one flange portion is brought into substantial registry with said aperture extension and the other flange portion is in engagement with the outside face of said plate and its arcuate portion is in bearing engagement with a portion of said aperture substantially juxtaposed to said aperture extension, whereby assembly or disassembly of said operating cam and plate may be effected, said flat main body portion having cam extension means for engagement with said cam-engaging means.

SIGURD BRANTINGSON.