May 1, 1945. R. I. SCHONITZER 2,374,840

ROTARY BOLT FOR DOOR LATCHES

Filed Nov. 19, 1941 2 Sheets-Sheet 1

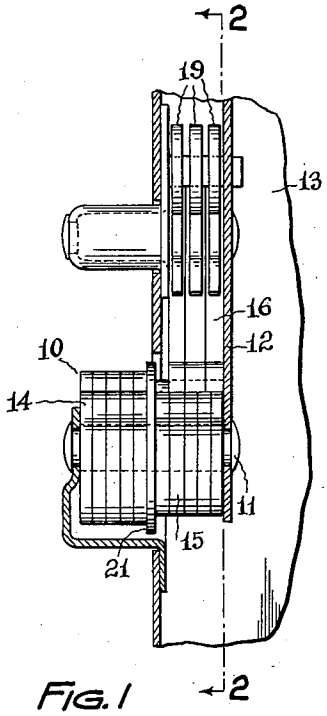


FIG. 1

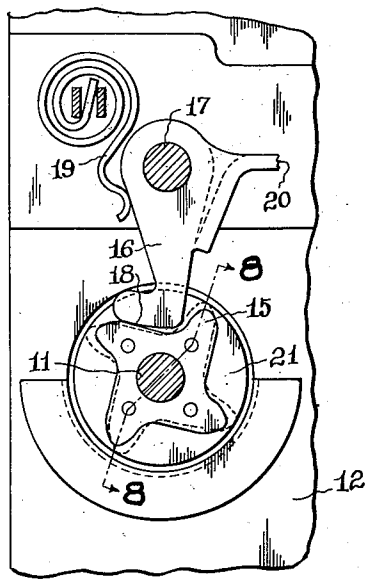


FIG. 2

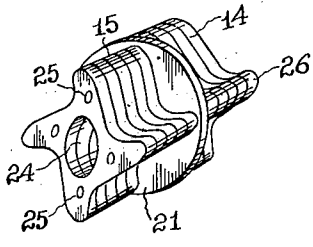


FIG. 3

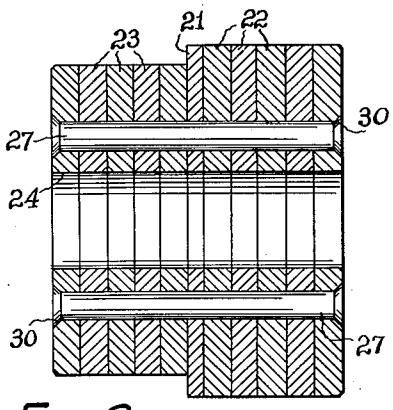


FIG. 8

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ROTARY BOLT FOR DOOR LATCHES

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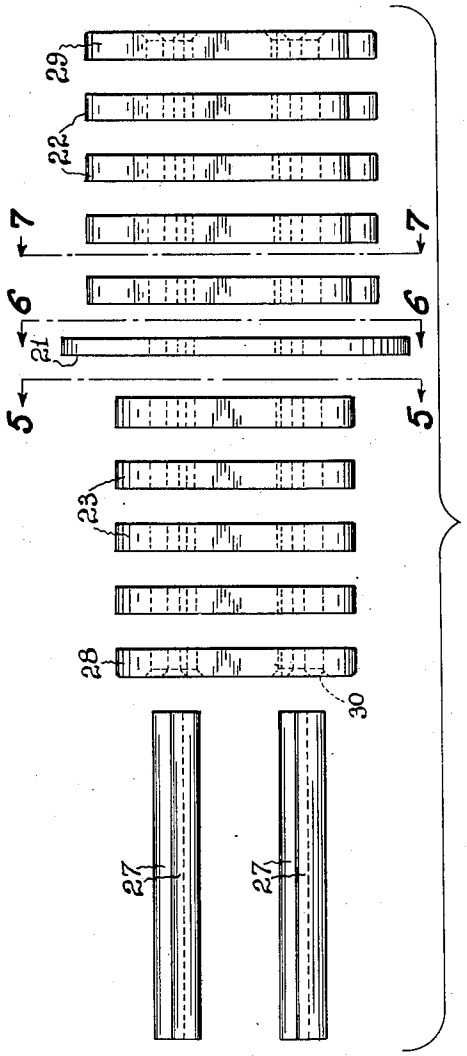


FIG. 4

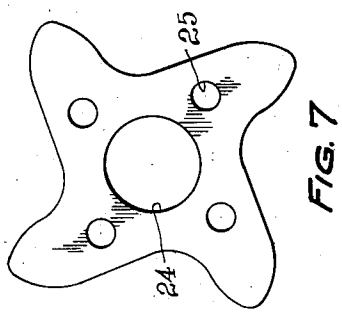


FIG. 7

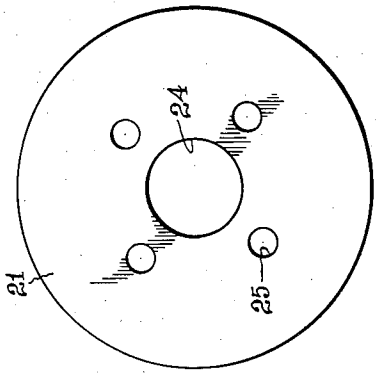


FIG. 6

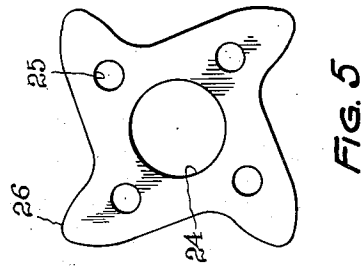


FIG. 5

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ROTARY BOLT FOR DOOR LATCHES

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Application November 19, 1941, Serial No. 419,665

2 Claims. (Cl. 292—2)

This invention relates to an improved rotary latch bolt and to a method of making such bolt. More particularly, the invention relates to a rotary bolt for use in a door latch of the type disclosed in United States Patent No. 2,224,512, issued December 10, 1940, to W. A. Endter.

The door latch illustrated and described in the aforesaid Endter patent includes a rotary bolt having, as integral parts thereof, a dogging portion and a latching portion. The dogging portion of the bolt consists of a plurality of peripherally spaced dogging heads adapted to be successively engaged by suitable dogs during respectively successive operations of the latch; and the latching portion of the bolt consists of a plurality of peripherally spaced latching heads adapted to be successively moved into latching engagement with a suitable keeper on a complementary structural element during the aforesaid respectively successive operations of the latch, there being a latching head corresponding to each dogging head. As a result, on engagement of the keeper by a latching head, the corresponding dogging head is simultaneously engaged by one or more cooperating dogs. The said dogs are movable to spring biased abutting relationship with the dogging head to maintain latching engagement of a latching head with the keeper, and, on subsequent operation of a door handle (operatively associated with the said dogs), the dogs are displaced to permit rotary motion of the bolt, whereby the said latching head may be rotated out of latching engagement with said keeper. Reference may be had to the above mentioned United States Patent No. 2,224,512 for a more detailed description of a door latch of the type hereinabove briefly referred to.

The object of the present invention is to provide a novel and improved rotary bolt of the type above discussed and wherein the dogging and latching portions of such bolt are assembled from a plurality of separately formed laminations.

A further object is the provision of a rotary bolt of laminated construction and wherein the several constituent laminations may be preformed to final cam contour prior to assembly thereof.

A further object is the provision of a rotary bolt of the laminated character heretofore referred to, and wherein the laminations thereof are securely interlocked to form a unitary structure.

A further object is the provision of a rotary bolt of laminated form, the dogging portion thereof being assembled from a plurality of laminations each adapted to be individually fabricated to produce progressive variations in cam contour, whereby a respective plurality of cooperating latch dogs may be caused to function in chronologically progressive succession or through varying increments of radial displacement.

A further object is the provision of a rotary bolt of laminated form, and wherein the laminations thereof may be formed from unlike materials, with such unlike laminations alternately positioned, if desired, in the assembled structure.

Still another object of the invention is the provision of novel and improved steps in a method of manufacture of a rotary bolt such as heretofore described.

Other objects and advantages of the present invention will be obvious, or will appear as the description thereof proceeds.

In the accompanying drawings, Figs. 1 and 2 are fragmentary views of a door latch of the type disclosed in the aforesaid Endter patent but including a rotary bolt of laminated form embodying the present invention, Fig. 1 being partly in section and partly in elevation and Fig. 2 being a section on the line 2—2, Fig. 1; Fig. 3 is a perspective view of the present improved rotary bolt; Fig. 4 is an exploded view, in side elevation and on an enlarged scale of the several elements of said rotary bolt, the two locking pins there shown being in their pre-locking form; Fig. 5 is a side elevation of one of the laminations of the dogging portion of the rotary bolt, as viewed from the line 5—5 of Fig. 4; Fig. 6 is a side elevation of the central disk which separates the latching portion of the bolt from the dogging portion thereof, as viewed from the line 6—6 of Fig. 4; Fig. 7 is a side elevation of one of the laminations of the latching portion of the bolt, as viewed from the line 7—7 of Fig. 4; and Fig. 8 is a sectional view on such enlarged scale, of the present rotary bolt, the view being on the line 8—8 of Fig. 2.

Before the present invention is described in detail, it is to be understood that such invention is not limited to the details of construction or the specific arrangement of parts herein illustrated or described, as the invention obviously may take other forms. It also is to be understood that the phraseology or terminology herein employed is for the purpose of description and not of limitation, the scope of the present invention being indicated by the claims.

Referring first to Figs. 1, 2 and 3, the reference numeral 10 designates generally a rotary bolt embodying the present invention, said bolt being mounted for free rotation on a stub shaft 11 fixed in a latch housing 12 carried by a door 13. One

end portion 14 of said bolt, the outer end portion when the bolt is mounted in place, constitutes the latching portion thereof, and the other end portion 15 of said bolt constitutes the dogging portion thereof. Each of such portions includes a series of peripherally spaced heads, there being four latching heads which are adapted for cooperative engagement with a keeper (not shown) on the door frame (not shown), and a corresponding number of dogging heads for cooperative engagement with a series of dogs 16 swingably suspended on a pin 17 carried by the latch housing 12. A detailed description of the function and operation of the several parts just referred to need not be given herein, as such a description will be found in the aforesaid Endter Patent No. 2,224,512. For the disclosure of this invention, it is sufficient to here state that when the door 13 is moved to closed position, one of the latching heads 26 of the bolt 10 rolls into engagement with the keeper, and simultaneously, one of the dogging heads 18 of the bolt moves into cooperative engagement with the dogs 16, as shown in Fig. 2. In such position of the parts, rotation of the bolt is prevented, and the door is thus latched in closed position, the springs 19 which engage said dogs tending to constantly rotate the bolt into latching position. To open the door, the dogs 16 are moved out of their cooperative engagement with the dogging portion of the latch bolt, by operation of the handle (not shown) for the door 13, as will be understood and as specifically pointed out in the aforesaid Endter patent.

In prior latches of the character here involved, the rotary bolts have been in the form of one piece metal members, such as die castings or the like. The present improved rotary bolt 10, however, is of laminated form, being assembled from a plurality of preformed laminations of any suitable sheet material such as metal, fibre, plastic and the like, or any combination of such materials, the several laminations being effectively maintained in rigid assembly in the manner and by the means to be hereinafter referred to.

As clearly shown in the accompanying drawings, the rotary bolt 10 here chosen for illustration has its latching portion 14 made up from a series of plate elements 22, and its dogging portion 15 made up from a series of plate elements 23. Although the number of plate elements in each of said series may vary, as desired, there are five plate elements in each series in the present embodiment of the invention. As clearly shown in Fig. 5, the five plate elements 23 which make up the dogging portion 15 of the rotary bolt have their peripheral contours shaped to provide dogging heads for use with the dogs 16, and as clearly shown in Fig. 7, the five plate elements 22 which make up the latching portion 14 of the rotary bolt have their peripheral contours shaped to provide latching heads for use with the latch keeper (not shown). Although the present invention is not limited thereto, the several plate elements 22 which make up the latching portion 14 of the bolt are of identical form and hence are interchangeable. Similarly, the several plate members 23 which make up the dogging portion 15 of the bolt are of identical form and hence are interchangeable. However, as here shown, the plate elements 22 differ from the plate elements 23 in peripheral contour, although as just stated, the present invention is not limited thereto.

If desired and as here shown, a disk 21 may be interposed between the laminations 23 which make up the dogging portion of the rotary bolt and the laminations 22 which make up the latching portion thereof, said disk closing the opening in the latch housing 12 through which the bolt extends, as indicated in Fig. 1, and preventing dirt and the like from accumulating on the interior parts of the latch, as will be readily understood.

As clearly shown in the accompanying drawings, the plate elements 22 and 23 and the disk 21 are each provided with a central bore 24 for the reception of the stub shaft 11 upon which they are mounted when assembled to form the bolt 10. Each of said plate elements 22 and 23 and the disk 21 is also provided, around its central bore 24, with a series of apertures 25, each such series here comprising four apertures, although the number thereof obviously may be varied. As here shown, the apertures of the plate elements 22 and 23 are located in the heads thereof, although the present invention is not limited to such a location therefor.

As shown in the accompanying drawings, the plate elements 22 and the plate elements 23 are disposed on opposite sides of the central spacing disk 21, with the central bores thereof in alignment and with the apertures 25 thereof in registry. Extending through each set of registered apertures 25 is a locking pin 27, the ends of the pins being headed over, as shown in Fig. 8, to maintain the plate elements 22 and 23 and the spacing disk 21 in rigid assembly. If desired and as here shown, the outer faces of the two end plate elements, designated by the reference numerals 28 and 29, may be recessed, as at 30, around the apertures 25 thereof to receive the heads of the pins 27, to thereby provide a rotary bolt with flat end faces, as shown in Fig. 8. Also, if desired and as here shown, the outer peripheral edges of the end plate elements 28 and 29 may be rounded off, as shown in Fig. 4.

As heretofore pointed out and as will be observed from an examination of Figs. 2 and 3, in the rotary bolt here shown the apertures 25 pass through the peripheral dogging and latching heads thereof, the corresponding pairs of said heads, while slightly out of exact registry, having enough stock in lineal alignment to permit of this arrangement. In some embodiments, not here illustrated, the dogging portion of the rotary bolt may be provided with either more or less heads than the latching portion, or said heads may be angularly displaced to such an extent, by reason of the position of the keeper or the dogs, that it is impossible to locate the apertures 25 in the latching and dogging heads while still maintaining registry of said apertures in both the latching and dogging portions. In this event, the apertures may be disposed in some other location, for instance closer to the central bore, whereby registry of the apertures can still be effected.

While the plate and disk elements hereinabove described may be formed from metal, such as the various available ferrous metals and alloys, one satisfactory material being a grade of mild steel, other materials of sufficient rigidity and otherwise desirable characteristics are suitable, such as certain grades of fiber board, raw hide, papier-mâché, etc. There is thus available a wide range of materials for selection, affording a choice, for instance, of various types of surfaces from which the user may obtain greater durability, longer wear, silent operation, or such other properties as may be characteristic of the particular material or materials selected.

As will be readily understood, the present invention embraces a rotary bolt wherein adjoining laminations of either the dogging portion or the latching portion, or both, may be of unlike materials, alternating successively, for example, between metal and fiber, whereby a balance may be attained between the desirable features of both materials. It is also possible to utilize a certain proportion of scrap metal clippings in the fabrication of some, or even all, of the laminations of rotary bolts embodying the present invention.

The latch fragmentarily shown in Figs. 1 and 2 has three dogs **16** which function as already described. It may be noted that as here shown, the width of the contacting face of a dog **16** is greater than that of any single lamination of the dogging portion of the bolt, three dogs equalling, in lateral extent, four such laminations. While certain structural advantages may attend this arrangement, the present invention is not limited thereto, but embraces a rotary bolt wherein each lamination of the dogging portion of the bolt has a corresponding dog, substantially coextensive in lateral extent therewith; and wherein the cam contour of neighboring laminations, which thus function with neighboring dogs, may vary progressively to produce a progressive advance in the order in which the dogs take hold, thereby decreasing the initial frictional resistance attendant upon simultaneous engagement of all dogs. With a bolt of such construction, the dogs may be identical size and contour, as will be readily understood.

Although the several structural elements of a rotary bolt such as above described may be fabricated and assembled in a number of ways, one such method is as follows:

A strip of plate of suitable material is first provided with a succession of grouped openings, each group comprising a centrally located bore **24** and a plurality of apertures **25** spaced therearound. Said plate or strip is then subjected to a further stamping operation so as to produce a plurality of plate-like member (Figs 4 to 7 inclusive) of the desired peripheral contour, each such member including a plurality of apertures **25** and a central bore **24**. For the form of rotary bolt here disclosed, three types of such stamped elements will be provided, consisting respectively of latching elements **22**, dogging elements **23** and disk-like elements **21**. Where extreme precision is desired, the plates thus formed may be subjected to a shaving operation on their peripheries and central bores to remove any taper which may be present, etc. If desired, the several plates may be flattened in a suitable press at any suitable stage in their manufacture to eliminate any deformation or warpage resulting from any of the preceding fabricating steps. A minor proportion of the plates, namely, those for use as end plates, may have their spaced apertures countersunk on one face and their peripheral edges rounded or beveled on the same face by a coining operation.

A group of plate members, fabricated as aforesaid, and consisting of a matched set of latching elements **22** and a matched set of dogging elements **23** are assembled respectively on opposite sides of a disk **21** in the manner indicated in Fig. **4** and held in assembled, stacked relationship by any suitable means, with the central bores **24** in alignment and with the apertures **25** in registry. Pins **27** are then inserted through the registered apertures **25**, said pins preferably fitting snugly to maintain the arranged position of the plate members, and the pins extending beyond the outer surfaces of the two end plates sufficient distances for the heading operation now to be described.

The assembly may then be placed upon a base plate suitably recessed to receive and align the bottom protruding ends of pins **27**, while the upper protruding ends are headed into the countersunk recesses of the end plates **28** and **29** by using a suitable perforated pressure plate in conjunction with heading plungers. The unit may then be reversed, and supported on a flat base while the other ends of the pins are similarly headed. A completed unit, thus assembled and rigidly locked, may, if desired, be subjected to a tumbling operation and may then, if desired, be cadmium plated or zinc plated.

Further features and advantages of the present invention will be readily apparent to those skilled in the art to which the present invention relates.

What I claim is:

1. A rotary latch bolt comprising a latch portion for cooperative engagement with a keeper, a dogging portion for cooperative engagement with a series of identical dogging elements, each said portion comprising a series of laminations, each of the laminations of the latching portion having a series of peripherally spaced latching heads, and each of the laminations of the dogging portion having a series of peripherally spaced dogging heads, there being a respective dogging element disposed to individually engage a dogging head of each lamination, the corresponding engageable surfaces of the series of dogging head laminations being progressively offset, each from the next, whereby to secure a respectively progressive advance in the order in which each dogging element engages its respective dogging head during one operation of said latch bolt.

2. A rotary latch bolt comprising a latch portion for cooperative engagement with a keeper, a dogging portion for cooperative engagement with a series of identical dogging elements, each said portion comprising a series of alternate metallic and non-metallic laminations, each of the laminations of the latching portion having a series of peripherally spaced latching heads, and each of the laminations of the dogging portion having a series of peripherally spaced dogging heads, there being a respective dogging element disposed to individually engage a dogging head of each lamination, the corresponding engageable surfaces of the series of dogging head laminations being progressively offset, each from the next, whereby to secure a respectively progressive advance in the order in which each dogging element engages its respective dogging head during one operation of said latch bolt.

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