Nov. 22, 1966 F. J. RUSSELL ETAL 3,287,047

LOW-FRICTION RETRACTOR

Filed Jan. 14, 1966

Fig. 1

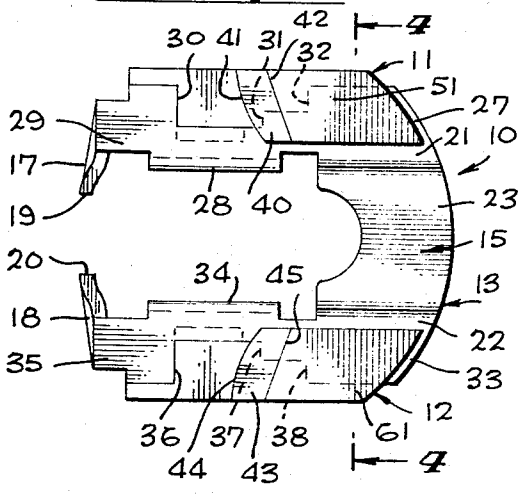


Fig. 2

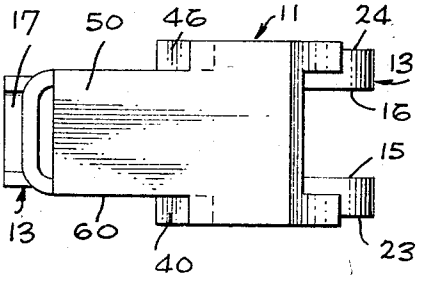


Fig. 3

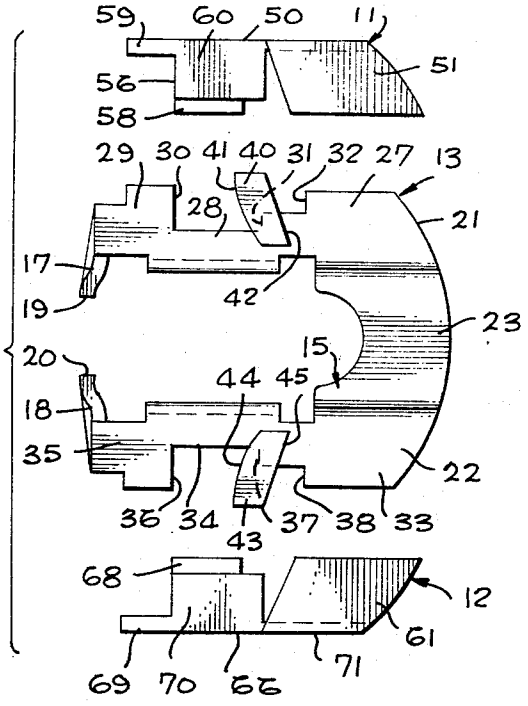
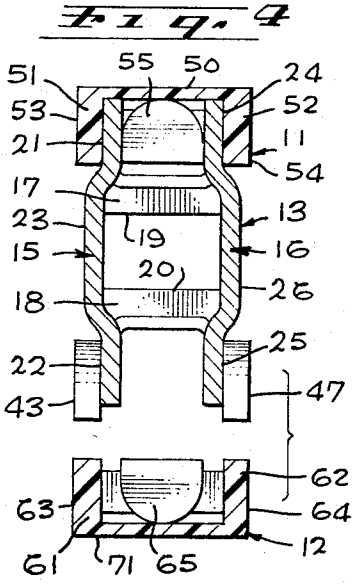


Fig. 4



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LOW-FRICTION RETRACTOR

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This is a continuation-in-part of patent applications Serial No. 145,133, filed October 16, 1961, and Serial No. 487,261, filed September 14, 1965.

The invention relates to door locks and has reference especially to that portion of the lock commonly identified as a retractor for the latch bolt and its relationship to portions of the lock which confine it. In still greater particular, the invention relates to a co-relationship between different kinds of materials in order to take advantage of new low-friction materials in certain strategic locations, while at the same time preserving in the lock the necessary ruggedness and dependability required of hardware of this kind.

The conventional arrangement of door locks of the kind here under consideration consists of a frame providing a chamber more or less at the mid-area of the lock in which spindles on opposite sides are mounted for rotation and within which is a retractor slide either made of formed sheet metal or some type of metal casting designed to be fastened to the tailpiece of a latch bolt assembly and to reciprocate by rotating retractor elements of the spindles. Under pressure exerted by the reciprocating elements, exterior portions of the retractor slide rub against interior portions of the frame as the frame guides the retractor slide during its movement. The frictional forces, of course, must be overcome by rotation of the spindles. A sufficient clearance must be provided between the retractor slide and the surrounding frame so that the friction will not be too great. The clearances, however, must not be too free, since, otherwise, the operation of the lock will be too noisy or the lock will not operate properly. Problems therefore are inherently present in an all metal lock.

It is therefore among the objects of the invention to provide a new and improved retractor slide for a door lock which is partially constructed of low-friction material arranged in such fashion that ruggedness and durability of the parts are not sacrificed.

Another object of the invention is to provide a new and improved retractor slide for a door lock, critical portions of which are of nonmetallic, low-friction material where there is movement against either the surrounding frame or with relation to actuation by the spindles, so that a maximum degree of advantage will be taken of the low-friction characteristics of the slide.

Still another object of the invention is to provide a new and improved retractor slide for a door lock wherein important portions are constructed of nonmetallic, low-friction material arranged in such fashion as to provide multiple advantages of low-friction character, in that exposed portions of the slide in those areas which are prone to engage metallic surfaces all present low-friction engaging areas partly to ease the guiding relationship of the slide in its frame, partly to minimize the effect of friction when the spindle is moved against it, partly to minimize the frictional resistance of other portions of the slide where it engages with the surrounding frame, and further, to minimize wear of the retractor and all lock parts which associate with the retractor, but wherein other portions are of metal to minimize gouging by complementary metal parts.

Also included among the objects of the invention is to provide a new and improved multiple piece retractor slide for a door lock, wherein certain interior parts and, on occasion, parts requiring appreciable tensile strength, continue to be constructed of metal, but wherein nonmetallic low-friction material is strategically joined with the metal portions, so that significant frictionally engaging surfaces of the slide consist of the low-friction material.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevational view of the retractor slide alone with all parts assembled.

FIGURE 2 is a plan view of the retractor slide of FIGURE 1.

FIGURE 3 is a side elevational exploded view.

FIGURE 4 is a partially exploded end elevational view on the line 4—4 of FIGURE 1.

In an embodiment of the invention chosen for the purpose of illustration, it will be assumed that portions of the lock mechanism with which it is associated are all substantially standard. In this instance, a composite slide indicated generally by the reference character **10** is provided with upper and lower shoes **11** and **12** joined respectively to a metal body or skeleton **13**.

The metal body or skeleton **13** may be described as consisting of opposite spaced side walls **15** and **16** laterally interconnected above the middle by a web **17** and below the middle by a web **18**. The web **17** has a downwardly extending free end **19** and the web **18** an upwardly extending free end **20**. These free ends **19** and **20** are vertically spaced from one another in positions facing each other for ultimate engagement with an appropriate conventional latch bolt assembly (not shown).

The side walls **15** and **16** are complementary relative to each other. It is sufficient that the midportions of these walls **15** and **16** extend for only a fraction of the over-all length of the skeleton **13**. The side wall **15**, for example, has an upper longitudinal edge portion **21** and a lower longitudinal edge portion **22**. These longitudinal edge portions **21** and **22** are located laterally inwardly with respect to a relatively flat midportion **23**. Similarly, on the opposite side wall **16** there are respective upper and lower longitudinal edge portions **24** and **25** located laterally inwardly relative to a midportion **26**.

The upper longitudinal edge portion **21**, for example, has a rear section **27**, an intermediate section **28**, and a front section **29**. There is a rearwardly facing shoulder **30** on the front section **29**, a forward facing shoulder **31** on the intermediate section **28**, and another forward facing shoulder **32** on the rear section **27**. The upper longitudinal edge portion **24** of the side wall **16** is similarly provided.

The lower longitudinal edge portion **22** of the side wall **15** consists of a rear section **33**, an intermediate section **34** and a front section **35**. The rearwardly facing shoulder **36** on the front section **35** is positioned opposite from a forwardly facing shoulder **37** on the intermediate section **34**, and another forwardly facing shoulder **38** on the rear section **33**. The lower longitudinal edge portion **25** of the opposite side wall **16** is similarly provided.

To complete the side wall **15**, there is provided a retractor guide or lug **40** tilted slightly forward, the guide having a forwardly facing arcuate edge **41** and a rear edge **42**. A retractor guide or lug **43** on the lower longitudinal edge portion **22** has a forwardly facing arcuate edge **44** and a rear edge **45**.

The side wall **16** is similarly provided with appropriately located upper and lower retractor guides **46** and **47**.

The upper shoe **11** is preferably made of a low-friction synthetic plastic resin material of one of the currently avail-

able commercial varieties and is adapted to fit over the upper longitudinal edge portions of the respective side walls **15** and **16**. On the upper shoe **11** is an upwardly or vertically outwardly facing frame engaging surface **50** running substantially the full length of the upper shoe **11**. To hold the upper shoe **11** in place, outer flanges **51** and **52** extend downwardly from the frame engaging surface **50** and overlie rear parts of the respective upper longitudinal edge portions **21** and **24**. The outer surface **53** of the flange **51** is substantially flush with the outer surface of the midportion **23**. The outer surface **54** of the outer flange **52** is approximately even with the outer surface of the midportion **26**. A web **55** interconnects the flanges **51** and **52** adjacent the rear and fits between inside surfaces of the upper longitudinal edge portions **21** and **24**.

Located relatively forwardly is a second flange **56** on one side of the uper shoe **11** and a similar second flange on the oposite side. The second flange **56** has a stepped portion **58**. The stepped portion **58** lies, when assembled, inside the intermediate section **28** and the main body of the second flange **56** is interposed between the rearwardly facig shoulder **30** and the forwardly facing shoulder **31**. A platform **59** overlies the upper part of the front section **29**. An outer face **60** of the second flange **56** is substantially flush with the outside face of the intermediate section **28**, thus leaving the arcuate edge **41** exposed. On the opposite side of the shoe **11**, similar structure interfits with similar appropriate portions of the upper longitudinal edge portion **24**.

In the interest of completeness, the lower shoe **12** may be described as provided with outer flanges **61** and **62** having respective surfaces **63** and **64**, the outer flanges **61** and **62** being interconnected by means of a web **65**. A second flange **66** has a stepped portion **68** and a platform **69**, the platform **69** overlying the front section **35**. An outer face **70** of the second flange **66** is made so as to be substantially flush with the outer face of the lower longitudinal edge portion **22**. The lower shoe **12** interfits with the lower part of the skeleton **13** in a manner similar to the fitting of the upper shoe **11** on the upper side.

In use, as previously noted, the free end **19** and **20** are adapted to engage a latch assembly. For moving the retractor from left to right, as viewed in FIGURES 1, 2, and 3, the conventional rollbacks on the spindle, which are radially extending metal elements, engage against one or another of the arcuate edges **41**, **44** on one side of the device, namely the side which includes the side wall **15**. In this way, the composite slide **10** may be forced in a direction from left to right. As it slides, surfaces **53** and **63** of the respective upper and lower shoes **11** and **12** are adapted to slide against complementary inwardly facing portions of the conventional frame. At the same time, surfaces **54** and **64** on opposite respective sides of the upper and lower shoes **11** and **12** are adapted to slidibly bear against the opposite inwardly facing part of the frame. Hence, all bearing surfaces of the composite slide **10**, where they engage inside faces of the respective frame, are a synthetic plastic resin material, namely a low-friction material having surfaces like the framc engaging surface **50** of the upper shoe **11** and a corresponding frame engaging surface **71** of the lower shoe **12**. This promotes the ease of operation of the composite slide **10** without need for the employment of any lubricant. At the same time, where any gouging, or knifing-in is likely to take place, as, for example, where appropriate, conventional rollbacks on the spindle engage and slide over the arcuate edges of the retractor guides or lugs, the contact is a metal-to-metal contact and hence, since the synthetic plastic resin material is kept clear of the lugs at the respective arcuate edges, the metal-to-metal wearing engagement takes place and provides the device with a long operating life.

Inasmuch as the free ends **19** and **20** are parts of the metal skeleton **13**, they have adequate tensile strength

where they are adapted to draw upon the latch bolt assembly every time the latch bolt is to be manipulated.

Accordingly, by the composite structure herein described, the metal core provides adequate strength and wear resistant bearing surfaces where metal is appropriate. The sliding portions of the composite slide **10** have all been made of a low-friction material, interlocked with the metal skeleton **13**, but wherein all exposed surfaces where a sliding engagement is to take place are surfaces of the plastic material. There has accordingly been provided a composite slide of different kinds of material wherein the particular characteristics of the materials are taken advantage of and combined together so that the resulting product is particularly efficient as well as rugged and strong in the areas needed.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims, so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A composite reactor for use with a conventional spindle having rotationally facing driving areas thereon, a conventional frame having interior guide surfaces and a conventional latch bolt assembly cooperable therewith, said retractor comprising a metal skeleton having engaging means at the forward end of said retractor adapted to engage said latch bolt assembly, said skeleton including opposite spaced side walls and upper and lower longitudinal edge portions on each of said side walls, upper and lower retractor guides on each side wall forming part of said metal skeleton, each said guide comprising a lug intermediate the forward and rear end of the respective longitudinal edge portion, each respective lug having an edge facing forward for engagement with said driving area and having a laterally outwardly facing side face, and a pair of upper and lower shoes of low-friction synthetic plastic resin material, said shoes having an interlocked engagement with respective upper and lower portions of said metal skeleton, each said shoe having a vertically outwardly facing frame engaging surface between opposite sides and lateral frame engaging side plates located rearwardly of the respective lug, each said side plate having the exposed side surface extending laterally outwardly at least as far as the adjacent side face of the respective lug.

2. A composite retractor for use with a conventional spindle having rotationally facing driving areas thereon, a conventional frame having interior guide surfaces and a conventional latch bolt assembly cooperable therewith, said retractor comprising a metal skeleton including opposite spaced side walls, upper and lower portions of said skeleton having free ends extending toward each other and spaced from each other for ultimate engagement with said latch bolt assembly, upper and lower retractor guides forming part of said metal skeleton on each side wall, each of said guides comprising a lug intermediate the forward and rear end of the respective longitudinal edge portion, each said lug having an edge facing forward for engagement with a respective driving area and having a laterally outwardly facing side face, and a pair of upper and lower shoes of low-friction synthetic plastic resin material, said shoes being adapted to fit over respective upper and lower horizontal edge portions of said metal skeleton, each said shoe having a vertically outwardly facing frame engaging surface between opposite sides continuous between forward and rear ends, retention plates on opposite lateral sides located forwardly and inwardly of the edge of the respective lug, and lateral frame engaging side plates located rearwardly of the respective lug, each said side plate having the exposed side surface extending

laterally outwardly at least as far as the adjacent side face of the respective lug.

3. A composite retractor for use with a conventional spindle having rotationally facing driving areas thereon, a conventional frame having interior guide surfaces and a conventional latch bolt assembly cooperable therewith, said retractor comprising a metal skeleton including opposite spaced side walls, upper and lower longitudinal edge portions of each of said side walls being located relatively inwardly and a midportion between said edge portions being located relatively outwardly, adjacent forward ends of said upper edge portions and adjacent the forward ends of said lower edge portions each having a connecting web, said webs having free ends extending toward each other and spaced from each other for ultimate engagement with said latch bolt assembly, upper and lower retractor guides forming part of said metal skeleton on each side wall, each said guide comprising a lug intermediate the forward and rear end of the respective longitudinal edge portion, each said lug having an edge facing forward for engagement with said driving areas and having a laterally outwardly facing side face, and a pair of upper and lower shoes of low-friction synthetic plastic resin material, said shoes being adapted to fit over respective upper and lower horizontal edge portions of said metal skeleton, each said shoe having a vertically outwardly facing frame engaging surface between opposite sides continuous between forward and rear ends, retention plates on opposite lateral sides located forwardly and inwardly of the edge of the respective lug, and lateral frame engaging side plates located rearwardly of the respective lug, each said side plate having the exposed side surface extending laterally outwardly at least as far as the adjacent side face of the respective lug.

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