

[54] **HIGH SECURITY PADLOCK FOR RAILROAD SWITCH LOCKING MECHANISM**

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[75] Inventor: **James L. Taylor**, Rochester, N.Y.

Primary Examiner—Robert L. Wolfe
Attorney—Thomas B. Van Poole et al.

[73] Assignee: **Sargent & Greenleaf, Inc.**, Rochester, N.Y.

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[57] **ABSTRACT**

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70/38 C, 51, 52, 54, 55, 56, 53, 203

A high security padlock for railroad switch locking stands, including a U-shaped shackle to extend through an aperture in an eye formation of a locking lever on the stand, and a padlock body having a pair of shroud shoulder formations projecting upwardly for unequal heights in enshrouding relation to three sides of the respective shackle legs. The shoulder formations extend into recesses in portions of the stand flanking the eye, when the shackle is in the eye, with the shorter shoulder spaced far enough to the confronting surface of the stand to permit insertion of the user's finger into holding relation with the shackle.

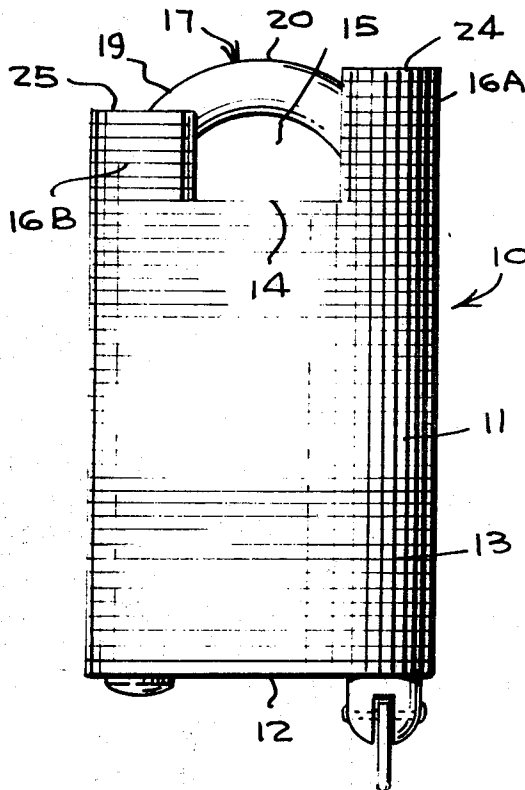
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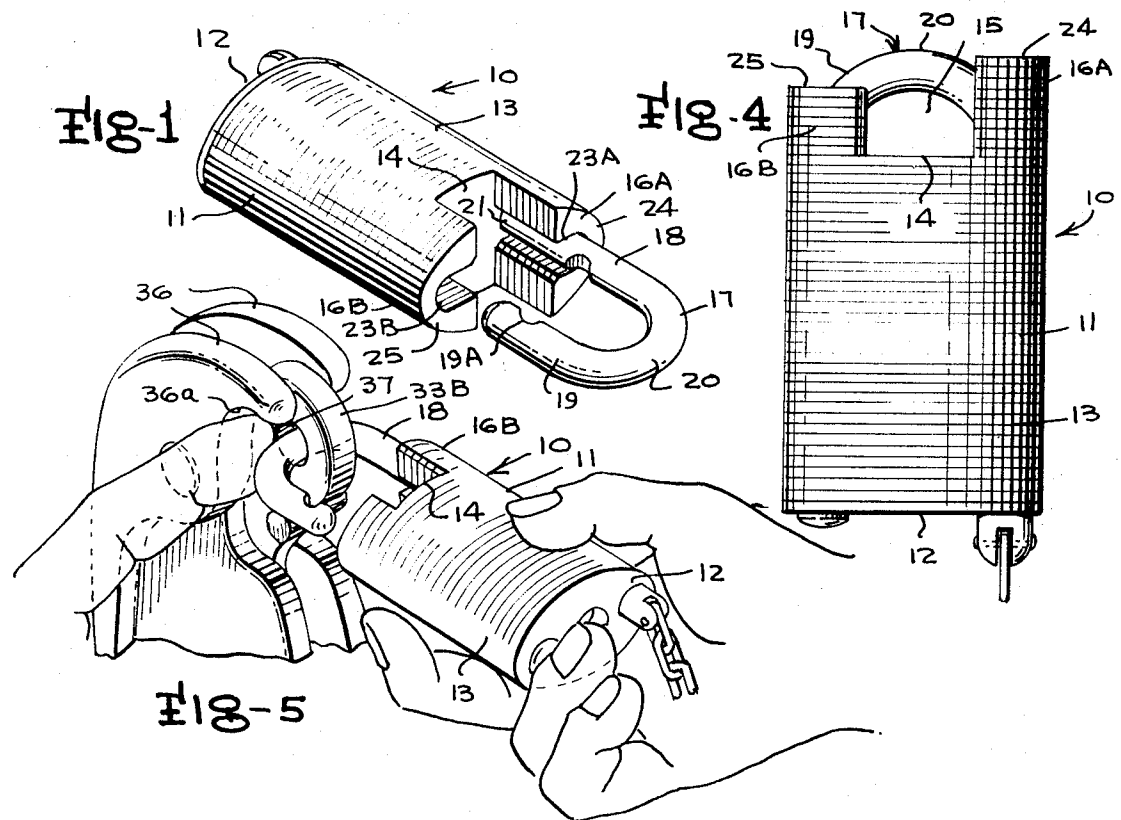
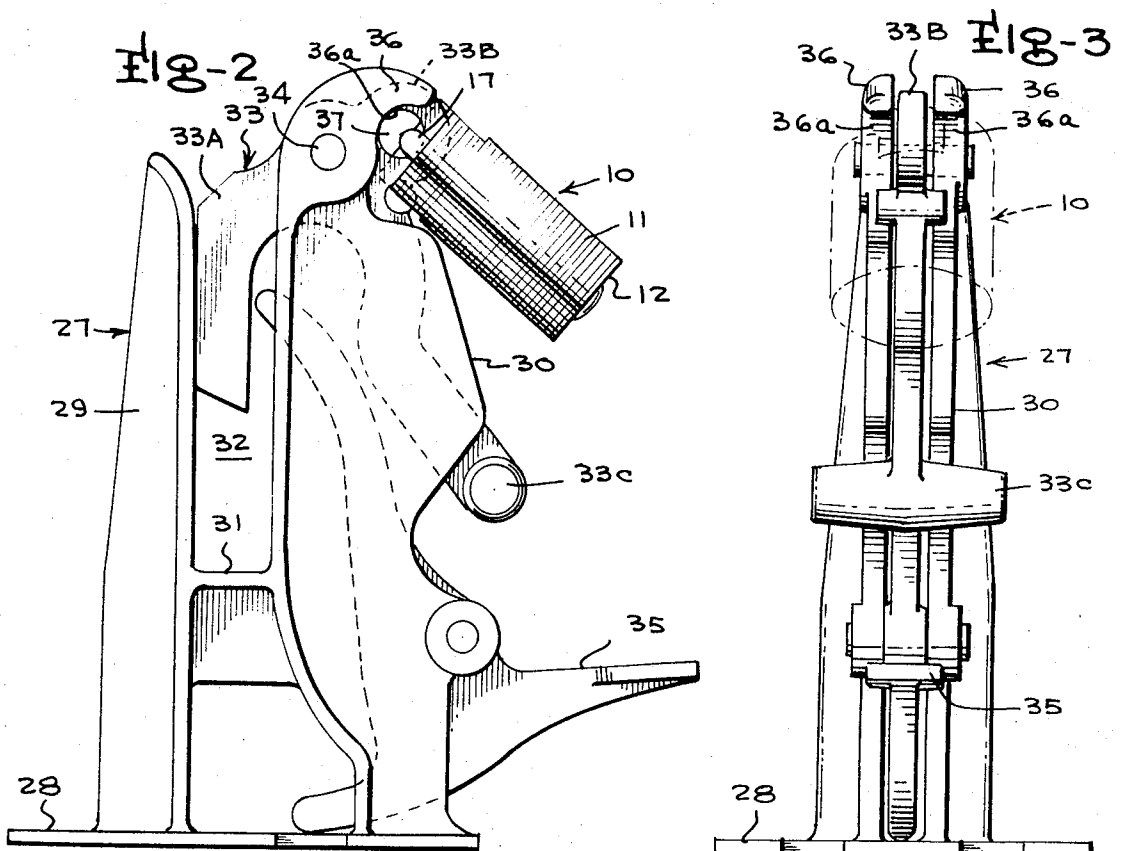
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10 Claims, 5 Drawing Figures





HIGH SECURITY PADLOCK FOR RAILROAD SWITCH LOCKING MECHANISM

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to high security padlocks having body formations for protecting portions of the shackle from attack in certain directions, and more particularly to high security key operated padlocks of the partially shrouded shackle type, specially designed for railroad switches, wherein the lock includes a U-shaped shackle projecting from the main portion of the padlock body and shielded by raised shoulders which cover and protect the major portions of the sides of the shackle.

The conventional type of padlock comprises a U-shaped shackle formed of a pair of spaced parallel straight legs joined by a curved intermediate portion, together with a padlock body which has a key lock plug for combination locking mechanism and a locking member, movable dog, or other members for locking end portions of the shackle leg within the padlock body with the shackle in a retracted, locking position. The upper portion of the padlock body has a pair of sockets or openings therein to accommodate the lower end portions of the shackle leg, and both shackle legs customarily have locking grooves or notches facing toward the center axis of the padlock body and located within the padlock body when the shackle is in the retracted position to lock the shackle in such position. In the locked position, the shackle is normally projecting in exposed upstanding relation from the padlock body to form a U-shaped loop which is closed or completed by the adjacent top surface of the padlock body, and the curved intermediate portion and substantial parts of the straight legs of the shackle are normally exposed from the padlock body itself and thus readily subject to attack by cutting instruments.

In many uses of the padlocks, the padlock is in an exposed position where it is not under constant supervision by security personnel, watchmen, or people charged with protecting the area in which the lock is located. In such situations, the padlock is so exposed that a person seeking unauthorized entry into the space secured by the padlock may attempt to saw through the shackle by various types of cutting instruments, or may insert a tool between hasp members secured by the shackle and the lock body to wedge or chisel the lock open. Such conventional padlocks could easily be defeated by picking, rapping, cutting, wedging, or other known burglary techniques. Usually locks that could withstand physical abuse were easy to pick and pick resistant locks could often be forced open by cutting or wedging.

To provide the very high security desired to protect padlocks in such exposed locations against attack by unauthorized persons, specially hardened padlock bodies and shackles have been resorted to, the number of pin tumblers or levers employed in the key cylinder or key locking mechanism has been increased and the key cylinder made to resist drilling, picking and like attack techniques. To protect the shackle against attack from the sides or from all directions by sophisticated cutting instruments, hardened padlock bodies have been developed having shroud formations which shield the sides and front of the shackle from attack by cutting instruments. In such locks, the padlock body has a rear-

wardly opening slot to receive a pair of flattened locking bars which are apertured and form what may be termed a hasp and keeper designed to be brought into abutment or approximate abutment with each other with the apertures therein registered with each other to receive the padlock shackle through the apertures while the forwardly projecting end portions of the hasp and keeper interfit into the rearwardly opening recess in the lock body. An example of such a construction is illustrated in U.S. Pat. No. 3,572,064.

High security shackle padlocks having such a completely shielding shroud portion covering the front and sides of the shackle, or having raised shoulders at the opposite sides which completely cover and protect the sides of the shackle and extend to approximately the level of the top of the intermediate curved portion of the shackle have been found to be unsuitable for one especially desirable application for high security padlocks, namely the provision of high security padlock locking of railroad switch operating mechanisms. Many railroad switches are in exposed locations that cannot be kept under constant surveillance, and are therefore exposed to improper or unauthorized operation by persons seeking to divert railroad traffic or interfere with the safe operation of the railroad. To provide maximum safety and security, it is highly desirable to provide extremely high security padlocks which will safely protect railroad switches against unauthorized operation. However, the hole in the apertured latch lever of conventional railroad switch locking stands which are normally used for locking the switch operating lever is sufficiently larger than the diameter of the shackle usually employed in high security combination padlocks that a lost motion coupling between the latch lever and the padlock shackle occurs which prevents one from moving the shackle completely to locked position after it has been unlocked. The apertured portion of the latch lever for the switch locking stand is disposed closely adjacent a recess in a yoke formation on the stationary body of the stand defining curved surfaces immediately above the aperture in the control lever when the switch operating mechanism is in position to be locked.

An object of the present invention is the provision of a high security key operable padlock having a U-shaped shackle and having raised shoulders extending from the padlock body which completely cover and protect the sides of the shackle, but which are of unequal height to provide access for the operator to insert his finger in contact with the shackle and push the shackle down into locked condition when the shackle is inserted through the apertured latch lever of the railroad switch locking stand.

Another object of the present invention is the provision of a novel high security, key operable combination padlock construction having a U-shaped padlock and raised shoulders which completely cover and protect the sides of the shackle and are especially designed to permit satisfactory assembly of the padlock in locked relation on a railroad switch locking stand.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a perspective view of a high security, key

operable, shackle padlock embodying the present invention;

FIG. 2 is a side elevation view of a typical railroad switch locking stand, with the high security padlock of the present invention assembled therewith;

FIG. 3 is a front elevation view of the railroad switch locking stand and padlock secured thereto;

FIG. 4 is a front elevation view of the padlock; and

FIG. 5 is a fragmentary perspective view showing the padlock in process of being assembled onto a switch locking stand.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, the high security padlock of the present invention is indicated generally by the reference character 10, and comprises a padlock body 11 of generally elliptical configuration in horizontal cross section or in top plan view, which may be a unitary casted body formed for example of hardened steel, or may be formed of a plurality of thin steel laminations, each consisting of a substantially oval or elliptical steel plate, which laminations are joined together by means such as a copper brazing process. The padlock body 11 forms the housing for the lock mechanism, not shown, which may be a key lock cylinder or a lock plug of any of a number of commercially available types. The lock body has a bottom wall 12, an oval side surface 13 over the major portion of the height of the padlock body extending upwardly from the bottom wall 12 and has a central upper platform surface 14 defining the bottom of an upwardly opening rectangular hasp recess 15 flanked by a pair of raised shoulder formations 16.

A shackle 17, preferably in the form of a U-shaped rod of hardened steel, has a longer leg 18 and a shorter leg 19 connected by an upwardly curved intermediate portion 20. The longer leg 18 of the shackle passes downwardly through an opening in the padlock body at the level of the platform surface 14 and extends a substantial distance within the padlock body toward the bottom surface, the leg 18 being retained in the main portion of the padlock body in a manner permitting a selected range of axial and rotatable movement of the longer leg relative to the padlock body 11 yet being normally restrained against withdrawal from the opening 21. The free lower end portion of the shorter leg 19 passes downwardly through a socket or opening in the portion of the padlock body at the level of the platform surface 14 when the shackle 17 is in the retracted or locking position illustrated in solid lines in FIG. 4. Both the shorter leg and the longer leg 19 and 18 of the shackle have locking notches or recesses, one of which is shown at 19A, confronting each other and facing toward the center axis of the padlock body to receive a suitable bolt or other locking device located within the main portion of the padlock body a short distance below the level of the platform surface 14. One example of the locking mechanism and locking bolt construction which may be employed is disclosed in earlier patent application Ser. No. 184,521 filed by Harry C. Miller on Sept. 28, 1971.

Both of the raised shoulder formations 16A, 16B have inwardly facing convex recesses 23A, 23B facing towards the center axis of the padlock body and confronting each other, defining wells which receive the

adjacent legs 18 and 19 of the shackle so that the shoulder formations form shrouds which surround three sides of the adjacent shackle leg. It will be noted that the top surface 24 of the raised shackle formations 16A shrouding the longer shackle leg 18 extends almost level with the uppermost edge of the curved intermediate shackle portion 20, providing protection against introduction of any cutting instrument into cutting contact with the shackle in a position where it might cut through the shackle when the padlock is assembled with the railroad switch locking stand with which it is to be used. The top surface 25 of the raised shoulder formation 16B, however, does not extend quite so high as the top surface 24, for purpose to be later described.

In one practical embodiment, the spacing between the two confronting portions of the shroud shoulders 16A, 16B laterally flanking the hasp recess 15, may be about fifteen-sixteenths inch, the height of the taller shroud shoulder 16A from the upper platform surface 14 may be seven-eighths inch, and the height of the shorter shroud shoulder 16B may be eleven-sixteenths inch.

The railroad switch locking stand with which the padlock 10 is to be used is illustrated in FIGS. 2 and 3 and is indicated generally by the reference character 27. The railroad switch locking stand 27 is of conventional construction and comprises a flat base flange 28 having, for example, outwardly opening slots through which rail spikes may be driven to fix the stand to a cross tie or similar mounting surface. The stand 27 has a body portion integral with and rising from the base flange 28 defining a somewhat U-shaped bracket member having a pair of leg portions 29, 30, spaced apart and having a cross-piece 31 collectively defining an upwardly opening channel 32 for receiving and restraining a switch operating member of the railroad switch mechanism against unauthorized operation when the switch operating member is held in the channel 32. The conventional switch locking stand 27 illustrated herein includes a channel closing lever 33 pivoted on the pivot pin 34 near the top of the leg portion 30, having a closure arm 33A which normally lies in blocking relation across the upper portion of the channel 32 when the closing lever is in the gravity biased normal position shown, and the lever 33 also includes an eye or apertured extension 33B and a counterweight formation 33C. In accordance with usual practice, a pivoted foot operating lever 35 is also pivoted in the leg portion 30 near the lower end thereof and has an eccentric finger projecting into a recess formation defined by the lever 33 to coordinate pivotal movement of the levers 33 and 35. The leg portion 30 forms a yoke between which the levers 33 and 35 are positioned, and has a pair of outwardly curving shoulders at the top thereof having concave surfaces 36a registering with and conforming to about a 90° segment of the opening 37 in the eye portion 33B of the closing lever 33. When a restraining rod or similar member, such as the shackle of a padlock, is inserted through the opening 37 in the closing lever eye portion 33B with the closing lever in the channel closing position shown, the lever 33 is locked against movement to channel opening position, because the restraining rod or shackle in the lever opening 37 abuts the concave restraining surfaces 36a of the shoulder formations 36 on the locking stand leg 30 as soon as the lever 33 begins to move from its normal closing position.

When the padlock 10 is assembled with its shackle extending through the eye portion 37 of the channel

closing lever 33 on the switch locking stand, the taller shoulder formation 16A extends into the recess in the leg portion 30 immediately below the concave restraining surface 36a to one side of the channel blocking lever with the top surface 24 of the padlock shoulders 16A closely adjacent to the restraining surface 36a. The other raised shoulder 16B of the padlock body must, however, be somewhat shorter than the shoulder 16A, so that its top surface 25 remains spaced from the confronting restraining surface 36a of the shoulder formation 36 on its side of the channel blocking lever to provide sufficient space for the operator's finger to be inserted between the surfaces 36a and 25 into engagement with the curved portion of the shackle 17 to depress the shackle toward the bottom of the padlock body a sufficient distance to cause the shackle to assume locked position relative to the padlock body. When the shackle, in open position, is inserted through the opening 37 in the channel blocking lever, and the padlock body is moved relative to the shackle to cause them to approach locking position, the finger of the operator must be in engagement with the curved portion of the shackle to hold the shackle against the portion of the bounding surface of the eye 37 opposite to the restraining surfaces 36a in order for the padlock body and shackle to be brought to the relative position wherein the bolt or latching formations can fit into the notches in the shackle leg and lock the shackle. If space were not afforded by the lower raised shoulder 16B for the operator's finger to restrain the shackle in the portion of the eye 37 nearest to the padlock body, the shackle could not be moved completely to locking position because the padlock body cannot move a sufficient distance toward the eye formation 37 to cause latching of the shackle when the shackle engages the surface portion of the eye nearest the restraining surfaces 36a.

With the lock construction herein described wherein the raised shoulder formations 16A completely surround three sides of the shackle leg 18 substantially to the top of the curved shackle portion, and the shorter shoulder 16B shrouds the shorter leg to within about one-quarter inch of the uppermost level of the shackle, effective protection of the sides of the shackle against cutting, wedging or other usual forms of attack by unauthorized persons is provided to effectively protect the railroad switch against operation by unauthorized persons even in areas where continuous security surveillance cannot be provided.

What is claimed is:

1. A high security padlock for securing in locked condition a railroad switch locking stand of the type including a locking lever having an apertured eye portion to receive a locking element therethrough and the stand including a stationary body portion having recesses laterally flanking opposite sides of the apertured eye portion bounded by curved abutment surfaces substantially registering with a segment of the aperture in said eye portion when the locking lever is in switch locking position, the padlock comprising a U-shaped shackle including a curved intermediate portion and a pair of shackle legs, a padlock casing including a main body portion having an upper shelf surface, the casing including a pair of laterally spaced sockets opening through said upper shelf surface for receiving the shackle legs and accommodating relative axial reciprocal movement of the shackle and casing between a lower locking position and an upper release position,

and the padlock casing including shroud formations extending upwardly from said main body portion having cavities therein to receive the two shackle legs and enshroud the shackle legs over substantially their entire height, the shroud formations including a first portion which extends into one of said recesses alongside said eye portion to a position immediately adjacent one of said curved abutment surfaces when the intermediate portion of the shackle extends through the eye aperture and a second portion of the shroud formation extends along the opposite side of the eye portion into the other of said recesses to a location sufficiently more remote from its confronting abutment surface to permit the operator's finger to extend laterally therebetween into restraining contact with the shackle for positioning the latter during relative movement of the padlock body to said locking position.

2. A high security padlock as defined in claim 1, wherein said shroud formations comprise a pair of laterally spaced shroud shoulders each enshrouding three sides of their associated shackle legs and defining a space between the spaced shoulders bottomed by said shelf surface for receiving the eye portion of said locking lever therein.

3. A high security padlock as defined in claim 1 wherein said main body portion is of elliptical horizontal cross-section and said shroud formations extend upwardly unequal heights from said shelf surface at the opposite ends of the elliptical body portion bisected by the major axis of the ellipse.

4. A high security padlock as defined in claim 2 wherein said main body portion is of elliptical horizontal cross-section and said shroud formations extend upwardly unequal heights from said shelf surface at the opposite ends of the elliptical body portion bisected by the major axis of the ellipse.

5. A high security padlock as defined in claim 1 wherein said main body portion is of elliptical horizontal cross-section and said shroud formations extend upwardly unequal heights from said shelf surface at the opposite ends of the elliptical body portion bisected by the major axis of the ellipse, the shroud formations having vertical parallel inner surfaces confronting each other through which said cavities protrude and having a truncated elliptical cross-section.

6. A high security padlock as defined in claim 2 wherein said main body portion is of elliptical horizontal cross-section and said shroud formations extend upwardly unequal heights from said shelf surface at the opposite ends of the elliptical body portion bisected by the major axis of the ellipse, the shroud formations having vertical parallel inner surfaces confronting each other through which said cavities protrude and having a truncated elliptical cross-section.

7. A high security padlock as defined in claim 1 wherein the first and second shroud portions have top surfaces spaced about seven-eighths inch and eleven-sixteenths inch respectively from said upper shelf surface.

8. A high security padlock as defined in claim 2 wherein the first and second shroud portions have top surfaces spaced about seven-eighths inch and eleven-sixteenths inch respectively from said upper shelf surface.

9. A high security padlock as defined in claim 5 wherein the first and second shroud portions have top surfaces spaced about seven-eighths inch and eleven-

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sixteenths inch respectively from said upper shelf surface.

10. A high security padlock as defined in claim 6 wherein the first and second shroud portions have top

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surfaces spaced about seven-eighths inch and eleven-sixteenths inch respectively from said upper shelf surface.

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