March 19, 1968 W. J. S. JOHNSON ETAL 3,373,465

LOCKING HOOK WITH ARCUATELY SLIDABLE LOCKING MEMBER

Filed March 24, 1966 3 Sheets-Sheet 1

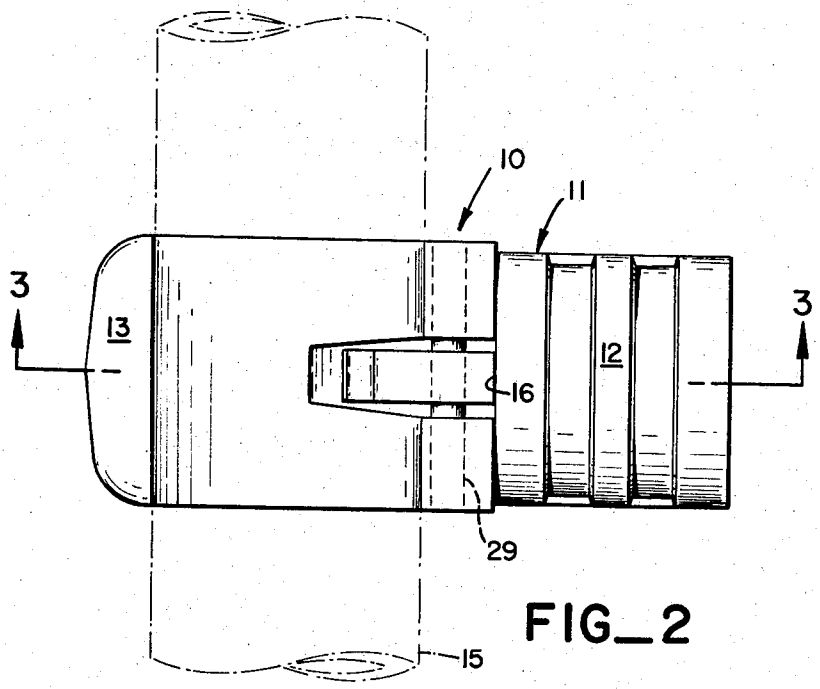


FIG_2

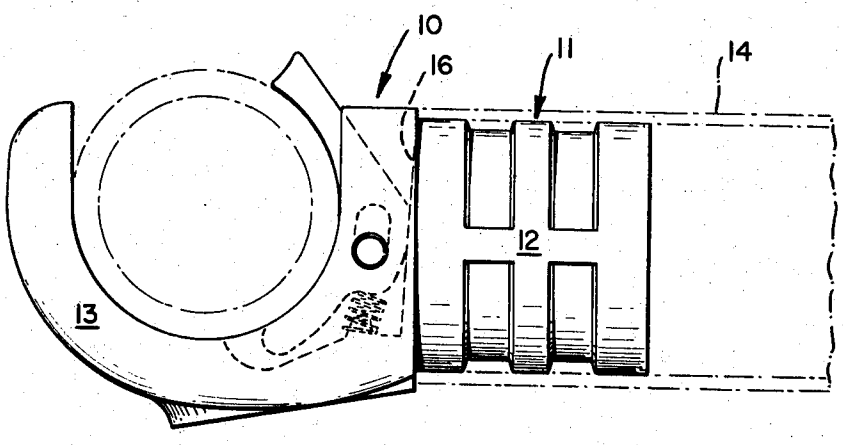


FIG_1

INVENTORS
WALLACE J. S. JOHNSON
GERALD LOUIS CLAXTON

Mellin, Moore & Weissenberger
ATTORNEYS

March 19, 1968 W. J. S. JOHNSON ETAL 3,373,465

LOCKING HOOK WITH ARCUATELY SLIDABLE LOCKING MEMBER

Filed March 24, 1966 3 Sheets-Sheet 2

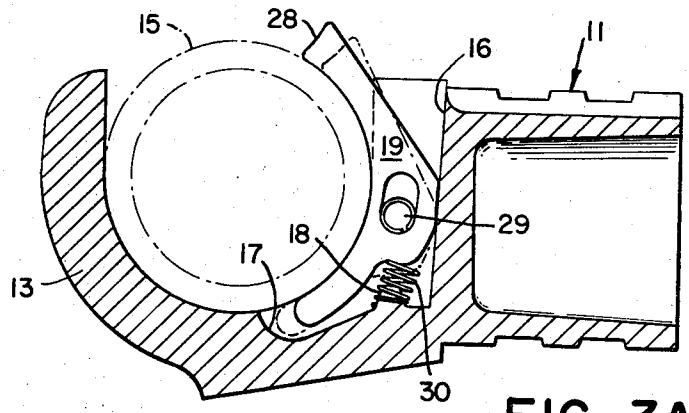


FIG_3A

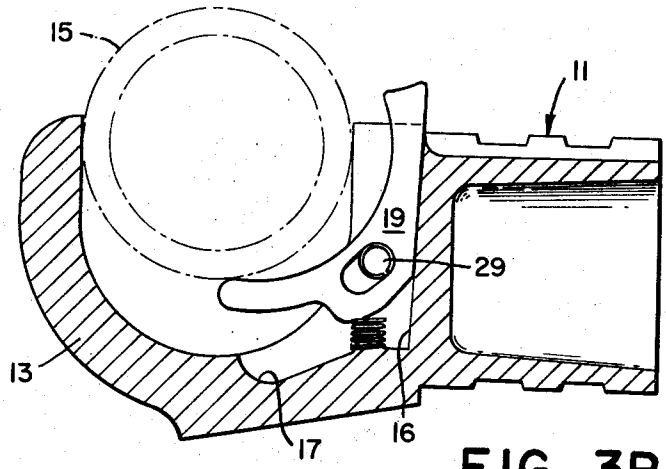


FIG_3B

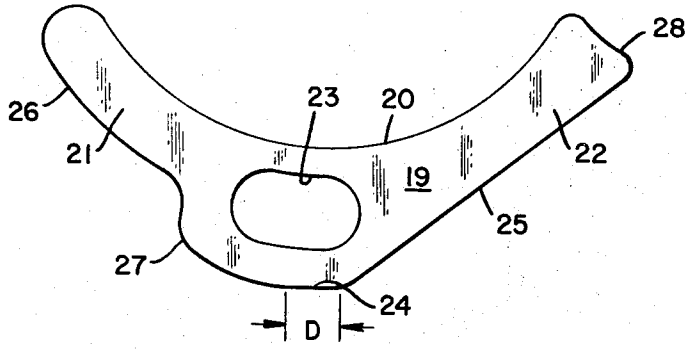


FIG_4

INVENTORS
WALLACE J. S. JOHNSON
GERALD LOUIS CLAXTON

Mellin, Moore & Weissenberger
ATTORNEYS

March 19, 1968 W. J. S. JOHNSON ETAL 3,373,465

LOCKING HOOK WITH ARCUATELY SLIDABLE LOCKING MEMBER

Filed March 24, 1966 3 Sheets-Sheet 3

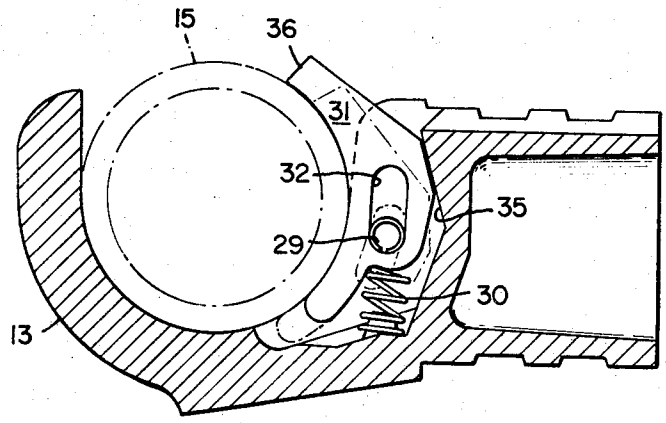


FIG_5A

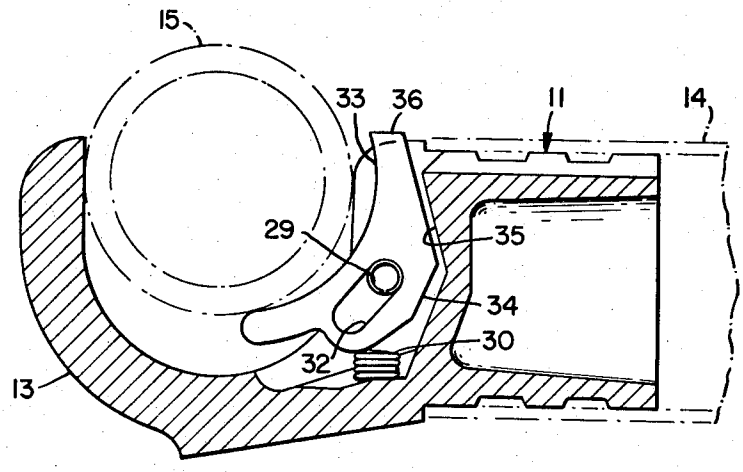


FIG_5B

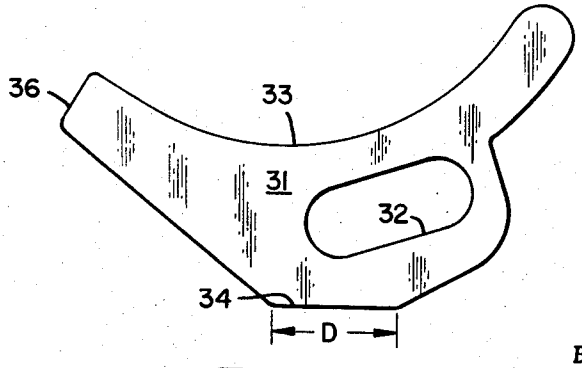


FIG_6

INVENTOR.
WALLACE J. S. JOHNSON
BY GERALD LOUIS CLAXTON

Mellin, Moore & Weissenberger
ATTORNEYS

United States Patent Office 3,373,465
Patented Mar. 19, 1968

3,373,465
LOCKING HOOK WITH ARCUATELY SLIDABLE LOCKING MEMBER

Wallace J. S. Johnson, Berkeley, and Gerald Louis Claxton, Albany, Calif., assignors to Up-Right, Inc., Berkeley, Calif., a corporation of California

Filed Mar. 24, 1966, Ser. No. 537,042
3 Claims. (Cl. 24—241)

ABSTRACT OF THE DISCLOSURE

A locking hook having a hook member defining a jaw and a plane surface, a locking member with a radius corresponding to the radius of the jaw, the locking member being pivotally mounted to the hook member and mounted for limited sliding movement relative thereto to define an innermost and outermost limit of sliding movement, with the hook member partially closing the opening of the jaw during the movement from innermost to outermost position, the locking member having a locking face which engages the plane surface of the locking hook when the locking member is at its outermost position, to thereby prevent pivotal movement of the locking member, and means for holding the locking member in its outermost position.

This invention relates to a locking hook releasably securable transversely to a cylindrical member. More particularly, it relates to a locking hook which automatically locks when in gripping relationship with the gripped cylindrical member, yet may be unlocked by a critically directed force on its locking member or latch to arcuately slide the member.

The closest prior art known is represented by W. J. S. Johnson, United States Patent No. 3,193,899, filed May 13, 1963, and issued July 13, 1965. Locking hooks, such as that described in the above patent, are particularly useful in the assembling of scaffolding. When used in association with scaffolding, the locking relationship must be as safe or secure as possible and, at the same time, allow a convenient and quick release for disassembly of the scaffolding. The locking hook shown in detail in U.S. Patent 3,193,899 has these important attributes.

The present invention, nevertheless, is an improvement over the prior art in that its ingenious design retains all of the convenience and safety features, yet eliminates a number of elements to thereby insure more reliable and efficient operation.

More particularly, the present invention relies on regular surfaces as opposed to the irregularly shaped surfaces such as ridges and shoulders necessary in the mechanism of U.S. Patent 3,193,389. The elimination of the irregularly shaped surfaces and associated elements is made possible by a critically shaped locking member which is described more particularly below.

It is, accordingly, an object of the present invention to provide a locking hook releasably securable transversely to a cylindrical member and which automatically locks when in place, with a minimum number of elements necessary for the operation thereof.

It is a further object to provide a locking hook with a critically shaped locking member which is both pivotally and slideably mounted in the jaw of the locking hook to thereby provide a locking means, with a minimum number of elements and a maximum degree of reliability.

Each of the above objects is fulfilled by the two embodiments shown in the drawings, wherein:

FIG. 1 is a side view of the locking member and shows the mechanism in the locked position with the jaw of the docking hook in gripping transverse relationship with the cylindrical member;

FIG. 2 is a top view of the locking hook of FIG. 1;

FIG. 3A is a sectional view taken on the line 3—3 of FIG. 2 and shows the locking member in the locked position. FIG. 3A also shows the intermediate unlocked position of the locking member in phantom;

FIG. 3B is a view taken on the line 3—3 of FIG. 2 and shows the locking member in the unlocked and open position to allow release of the cylindrical member from the jaw of the locking hook; and

FIG. 4 is a side view of the locking member of FIGS. 3A and 3B;

FIG. 5A is a sectional view of a second embodiment which differs from the embodiment of FIGS. 1–4 in the shape or configuration of the locking member and the locking surfaces with which it is associated. The hook is shown in the locked position. FIG. 5A also shows the intermediate unlocked position of the locking member in phantom;

FIG. 5B is a view similar to the view of FIG. 5A and shows the locking member in the unlocked and open position to allow release of the cylindrical member from the jaw of the locking hook; and

FIG. 6 is a side view of the locking member of FIGS. 5A and 5B.

The invention comprises a hook member having a semi-cylindrical jaw and a plane surface parallel to and spaced from the axis of the jaw; a critically shaped locking member, means mounting the locking member to the hook member for critical pivotal and sliding movement and for a critical relationship with the plane surface; and resilient means for urging and automatically positioning the locking member in a locked position when the jaw of the locking hook is in engagement with the surface of the cylindrical member transversely secured thereto.

With reference first to the embodiment of FIGS. 1–4 and with particular reference to FIGS. 1 and 2, the locking hook **10** includes a hook member **11** which has a cylindrical portion **12** and an integrally formed semi-cylindrical jaw **13**. Locking hook **10** may be permanently inserted into a pipe or scaffolding member **14** as shown in FIG. 1. It may then be used to safely and securely grip a transverse cylindrical scaffolding member **15** as shown in FIG. 2.

Semi-cylindrical jaw **13** is therefore formed with an inside radius which corresponds with the radius of the gripped cylindrical member.

As best seen in FIGS. 3A and 3B, hook member **11** also includes a plane surface **16** which is spaced from the inside circumference of semi-cylindrical jaw **13** and extends parallel to the axis thereof. Plane surface **16** is disposed in a recess in hook member **11** and the recess includes an extension **17** in the direction of the interior of jaw **13** for a purpose which will be later described.

A stud **18** is disposed near the interior end of plane surface **16** and projects generally parallel thereto, as best seen in FIGS. 3A and 3B.

Locking member **19** is pivotally and slidably mounted in locking hook **11** and is critically shaped. The critical design of locking mmeber **19**, best seen in FIG. 4, includes a semi-cylindrical concave retaining surface **20** which has a radius corresponding to the radius of jaw **13** and gripped cylindrical member **15**. Retaining surface **20** extends an angular distance of roughly 115° and includes a leg **21** and a leg **22**.

Locking member **19** includes a slot **23** formed between legs **21** and **22**. Slot **23** is arcuately shaped and is parallel with retaining surface **20**. Locking member **19** also includes a locking face **24** which is a plane surface generally parallel with and spaced from slot **23**. Locking face **24** extends a distance D as shown in FIG. 4.

A plane surface 25 defines one edge of leg 22, and extends from locking face 24 generally in the direction of the retaining surface 20 and is spaced therefrom.

Leg 21 is defined by surface 26, which is parallel with retaining surface 20. Surface 26 and locking face 24 are joined by shoulder 27.

One end of leg 22 is preferably formed with a slight concave surface 28 for a purpose to be later described.

Locking member 19 is pivotally and arcuately mounted in hook member 11 as best seen in FIGS. 1, 2 and 3. Roll pin 29 extends transversely through hook member 11 in spaced parallel relationship with plane surface 16 and the axis of jaw 13. Roll pin 29 extends through slot 23. Locking member 19 is therefore mounted for pivotal movement in a plane perpendicular to the axis of jaw 13. It is slidably mounted for arcuate movement because of slot 23, from an outermost position shown in FIG. 3A to an innermost position shown in FIG. 3A in phantom.

The outermost position is defined by roll pin 29 in contact with the lower limit of slot 23 so that locking member 19 is arcuately moved away from the interior of jaw 13. The innermost position is defined by the upper limit of slot 23 in contact with roll pin 29 and with locking member 19 arcuately moved into a position toward the interior of jaw 13.

Leg 21 of locking member 19 is accommodated in recess 17 throughout the arcuate movement and retaining surface 20 (throughout the arcuate movement) is coincidental with the surface of gripped cylindrical member 15.

Locking member 19 is locked against pivotal movement in the outermost position by means of locking face 24 in engagement with plane surface 16 as shown in FIG. 3A. Locking member 19 is urged into its outermost or locked position by means of helical coil spring 30 seated on stud 18. Coil spring 30 is in compression against shoulder 27 of locking member 19.

The relationship between locking face 24, plane surface 16 and the means mounting locking member 19 is critical. When locking member 19 is arcuately moved into its outermost position, locking face 24 and plane surface 16 must interact to prevent pivotal movement of locking member 19. Locking face 24 engages plane surface 16 when locking member 19 is at its outermost limit of arcuate movement (to thereby prevent piovtal movement thereof) but does not engage plane surface 16 when locking member 19 is at its innermost limit of arcuate movement (to thereby allow pivotal movement thereof).

The pivotal movement of locking member 19 may be seen by comparing the innermost position of locking member 19 shown (in phantom) in FIG. 3A with the position of locking member 19 shown in FIG. 3B. With locking member 19 in its innermost position, locking face 24 becomes disengaged from plane surface 16 and locking member 19 may be pivoted into the position shown in FIG. 3B. Locking member 19 is moved from its outer position by force exerted against concave surface 28 in a direction generally parallel with retaining surface 20.

The locking hook described may be secured to a transverse cylindrical member by placing locking member 19 into the position shown in FIG. 3B. Cylindrical member 15 is then moved into the opening of jaw 13 and contacts legs 21. As jaw 13 is moved into complete engagement with cylindrical member 15, locking member 19 is caused to pivot about roll pin 29 into the intermediate innermost position shown in phantom in FIG. 3A. Spring 30 then urges locking member 19 arcuately into the outermost or locked position shown and simultaneously locking face 24 engages plane surface 16 and pivotal movement is prevented. The locking hook is thus locked in place.

To release the locking hook from its gripping relationship with cylindrical member 15, a force is applied arcuately against locking member 19 at surface 28, and locking member 19 is arcuately moved into its innermost or unlocked position. Cylindrical member 15 can then be lifted out of jaws 13, causing locking member 19 to pivot about roll pin 29 as cylindrical member 15 is withdrawn.

A second embodiment is shown in FIGS. 5 and 6. The embodiment differs from the embodiment of FIGS. 1–4 in the shape or configuration of the locking member, and its interrelated locking surface.

With reference to FIGS. 5 and 6, locking member 31 is pivotally and slidably mounted to locking hook 11 by means of roll pin 29 which slidably engages slot 32. As distinguished from slot 23 of locking member 20 (see FIG. 4), slot 32 is not arcuate. Slot 32 is formed with straight parallel sides.

Locking member 31 has a concave cylindrical retaining surface 33 which extends an angular distance of about 108°. Locking face 34 which extends for distance, D, on the opposite side of slot 32 from concave retaining surface 33 and is positioned at approximately a 17° angle from slot 32. In other respects locking member 31 is similar in configuration to locking member 19.

The locking surface 35 of the embodiment of FIGS. 5A and 5B is formed at an angle of about 105° from the longitudinal axis of the tubular scaffold member 14.

Locking member 31 of the embodiment of FIGS. 5 and 6 is pivotally and slidably movable from an outermost locked position shown in FIG. 5A against the resiliency of spring 30 to an innermost unlocked position shown in FIG. 5B. In the locked position locking face 34 engages locking surface 35 with concave retaining surface 33 uniformly engaging the outside cylindrical surface of gripped member 15.

Gripped member 15 is released by sliding and pivoting locking member 33 to the intermediate position shown (in phantom) in FIG. 5A to disengage locking face 34 from locking surface 35 and allow locking member 31 to pivot about pin 29 to the position shown in FIG. 5B. Locking member 33 may be so moved by thumb pressure against surface 36.

Changes may be made in the two embodiments shown without departing from the scope of the invention. For example, the means for mounting locking member 19 in hook member 11 may vary as long as the mounting provides the critical pivotal and arcuate movement. Various means for urging locking member 19 (and locking member 31) into its outermost or locked position may also be employed without departing from the scope of the invention.

Having thus described our invention, we claim:

1. Apparatus releasably securable transversely to a cylindrical member which comprises:

(a) a hook member defining a semi-cylindrical jaw and a plane surface parallel to the axis of said jaw and spaced therefrom;

(b) a locking member having a semi-cylindrical concave retaining surface with a radius corresponding to the radius of said jaw and a planar locking face generally parallel to the axis of said retaining surface and spaced outwardly therefrom;

(c) means mounting said locking member to said hook member for pivotal movement in a plane perpendicular to the axis of said jaw and for limited sliding movement defining a path parallel to said retaining surface toward and away from the interior of said jaw to thereby define an innermost and outermost limit of sliding movement respectively, with said retaining surface disposed coincidentally with said jaw partially closing the opening thereof during said movement;

(d) said locking face engaging said plane surface when said locking member is at said outermost limit of movement, to thereby prevent said pivotal movement thereof, but not engaging said plane surface when said locking member is at said innermost limit of movement, to thereby allow said pivotal movement thereof; and

(e) means for holding said locking member in said outermost limit of movement.

2. The apparatus of claim 1 wherein said locking member defines a slot spaced from said retaining surface and wherein said means mounting said locking member to said hook member comprises a pin extending through said hook member and said slot in a direction parallel to said axis of said jaw.

3. The apparatus of claim 1 wherein said means for holding said locking member in said outermost limit of arcuate movement comprises a spring seated on a stud, said spring engaging the shoulder of said locking member.

References Cited

UNITED STATES PATENTS

28,669	6/1860	Henshaw	24—239
518,131	4/1894	Beckeman	294—83
1,576,197	3/1926	Kuffel et al.	294—83
3,193,899	7/1965	Johnson	24—241
3,292,226	12/1966	Foster	24—239

DONALD A. GRIFFIN, *Primary Examiner.*