

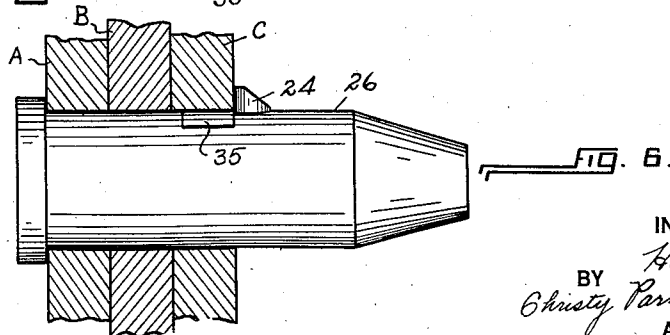
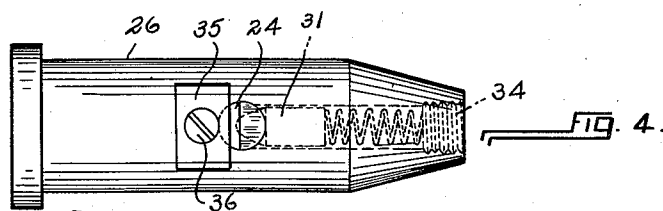
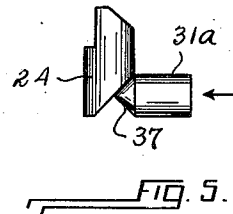
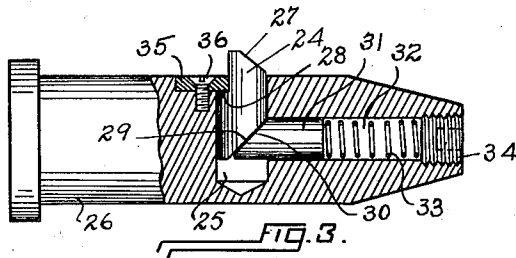
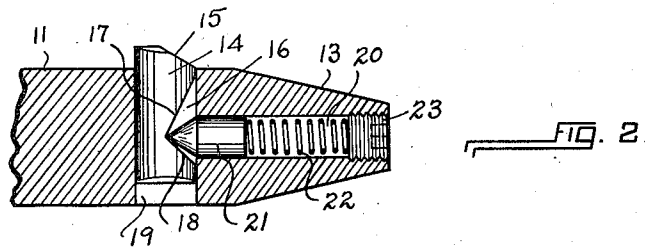
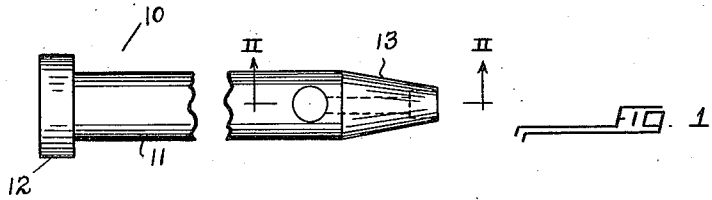
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SELF LOCKING BOLT

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## UNITED STATES PATENT OFFICE

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## SELF-LOCKING BOLT

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11 Claims. (Cl. 85—5)

My invention relates in general to a bolt and particularly to a self-locking bolt or pin which has a head on one end and means on the other end which normally serves to restrain the bolt against accidental endwise movement, such means being of the type which can be readily operated to permit endwise movement of the bolt.

Such bolt may be very readily placed in position to unite members such as portions of a knockdown bridge or other temporary or demountable structure.

Heretofore bolts of this type have employed relatively expensive detent means and are frequently of somewhat intricate designs. My invention consists of an improvement in such bolts or pins and provides a device which will be positively retained in position and can be quickly and easily inserted or removed by the operation of a spring actuated locking member. A bolt including the detent means of my invention is simple in construction, relatively inexpensive to manufacture, sturdy and simply operated.

In the accompanying drawing I have shown for purposes of illustration several preferred embodiments of my invention.

Fig. 1 is a fragmentary view of the body of the bolt,

Fig. 2 is a fragmentary view in section and to larger scale of the end of the bolt showing the detent in elevation,

Fig. 3 is a view partly in side elevation and partly in section of a modified bolt,

Fig. 4 is a view in elevation of the top of the bolt shown in Fig. 3,

Fig. 5 is a view of a modified detail and

Fig. 6 is a view showing the bolt in side elevation securing three members in assembled position.

In Figs. 1 and 2 of the drawing, the numeral 10 indicates a bolt made according to my invention. The bolt 10 consists of a shank portion 11, a head 12 which may be formed integral with the shank, or separately made and threaded on the end of the shank, and a point portion 13, in or adjacent to which the locking mechanism is located.

The detent 14 is preferably circular in section and has the upper end, as viewed in Fig. 2, cut away on a slope 15 of the order of 45°. A V-shaped groove 16, having plane shaped sides or cam faces 17 and 18, is formed in the body of the detent and on the same side as the slope 15. The inclination of the upper cam face 17 with the vertical is less than the inclination of the

lower cam face 18 with the vertical. Suitable angles are 30° and 55° respectively. The detent 14 is slidably received in the round aperture or hole 19 in the shank 11 adjacent the pointed end 13.

A circular passage or bore 20 extends from the point of the bolt rearwardly along the bolt axis and opens into the aperture 19. In this passage a conical pointed cylindrical pin 21 is slidably received and is urged along the passage with the pointed end extending toward aperture 19 by a coiled spring 22, one end of which bears against the unpointed end of the pin, and the other end against a screw 23 which is threaded into the outer end of the passage 20. The sides of the cone point form an angle of about 60°.

The detent 14 is slightly less in length than the diameter of the shank, and the ends are curved so that the detent when forced into the hole 19 does not protrude, and the bolt can thus freely slide through a hole which is of the same diameter as the shank portion 11. The groove 16 is so located that when the pointed end of pin 21 is at the bottom of the groove the upper or sloped end of the detent will project above the shank 11 of the bolt to the coupling or locking position as shown in Fig. 2. The force of the spring 22 acting through the cooperation of the pointed end of pin 21 and the cam face 17 urges the detent upwardly and holds it in locking position. When it is desired to move the bolt endwise the detent 14 is pushed into the hole 19 by pressure exerted on the sloped face 15, whereupon the bolt may be moved endwise. As soon as the downward pressure on the detent is released the force of the spring 22 acting on the pin 21 and cooperating cam face 17 will move the detent outwardly to locking position as shown in Fig. 2.

In Figs. 3 and 4 I have shown a modified form of my invention. Here the detent 24, preferably circular in cross section, is slidably received in the hole 25 which does not extend all the way through the shank 26. The detent has a sloped face 27 formed on the upper or outer end and on the opposite side a portion is cut away to form a shoulder 28. The lower part of the detent has a cam face 29 formed on the side opposite the shoulder 28. The cam face is preferably at a 45° angle, and cooperates with a like cam face 30 on the end of pin 31 which is slidably received in the axial bore 32. The pin 31 is urged toward the hole 25 by the compressed coil spring 33 which bears at its outer end against the screw 34 threadedly secured in the outer end of the

bore 32. The movement of the pin 31 toward the detent 24 urges the detent upwardly to locking position. The outward or upward movement of the detent 24 is limited by the shoulder 28 bearing against a stop plate 35 which is set into the shank 11 and attached thereto by the screw 36. The top of the plate 35 is curved to correspond with the shank 26 and does not extend thereabove. The stop plate 35 also insures that the detent 24 will not turn in the hole 25. The detent or catch 24 is of such length and the shoulder so located that in the locking position, see Fig. 3, the outer end of the detent will extend beyond the shank and when forced into the hole 25 it will be received in the hole 25 so that the outer end of the catch will be below the surface of the shank a position which will be referred to as the releasing position.

In Fig. 5, I have shown a modified pin 31a for use in place of pin 31 in the bolt shown in Figs. 3 and 4. The point 37 of the pin is conical.

In Fig. 6, I have shown a bolt similar to the bolt shown in Figs. 3 and 4 in coupling position, where it serves to secure together the members A, B and C which may be parts of a bridge or any other structure which it is desired to releasably couple together.

An important feature of my invention resides in the fact that the bolt may be prepared to receive the detent by two simple drilling operations, one at right angles to the axis of the bolt and the other along the axis. The remaining parts, save the spring, are simple and inexpensive screw machine products.

The point portion of the bolt is tapered to provide for easy insertion of the bolt into the openings in the members to be coupled. The bolt is customarily made of metal although other materials such as plastic could be employed for all or some of the parts except the spring for urging the pin into or against the detent.

It will be evident from the foregoing that I have invented a simple, inexpensive and positive self-locking bolt or coupling pin which can be used to secure various members of a structure together. The bolt can be easily inserted in coupling position and locked against accidental displacement, and when desired the bolt can be quickly and readily unlocked (by manual actuation of the detent) and then withdrawn from the coupling position.

While I have illustrated and described certain preferred embodiments of my invention, it will be understood that this is merely by way of illustration and that the invention may be embodied and practiced in constructions other than those specifically disclosed herein.

I claim as my invention:

1. A self-locking bolt including a head, a shank, and a point portion, an aperture in the shank adjacent the point portion, a detent slidably received in the aperture, said detent having a V-shaped groove in the side thereof, a passage extending from the end of the point portion into the aperture, a pin in said passage, and means for urging the pin toward said aperture into engagement with said detent.

2. A self-locking bolt including a head, a shank, and a point portion, an aperture in the shank adjacent the point portion, a detent slidably received in the aperture, said detent having a V-shaped groove in the side thereof, a passage extending from the end of the point portion into the aperture, a pin in said passage, means for closing the outer end of the passage, and a spring

interposed between the pin and the closing means for urging the pin into the groove in the detent into engagement with said detent.

3. A self-locking bolt including a head, a shank, and a point portion, an aperture in the shank adjacent the point portion and transverse to the longitudinal axis of the bolt, a detent slidably received in the aperture, said detent having a V-shaped groove in the side thereof, a passage extending from the end of the point portion into the aperture, a pin in said passage, and means for urging the pin toward said aperture into engagement with said detent.

4. A self-locking bolt including a head, a shank, and a point portion, an aperture in the shank adjacent the point portion, a detent slidably received in the aperture, said detent having a V-shaped groove in the side thereof, the sides of the groove being plane surfaces, the upper side being at an angle to the vertical which is smaller than the angle of the lower side, a passage extending from the end of the point portion into the aperture, a pin in said passage, and means for urging the pin toward said aperture into engagement with said detent.

5. In a self-locking bolt including a head, a shank, a point portion and a depressible detent in the shank adjacent the point portion, the invention which consists of detent means all parts of which are slidably received in a hole of constant section in said shank substantially at right angles to the longitudinal axis of the shank, said detent being less in length than the depth of the hole, a cam surface on said detent angularly disposed with respect to the vertical axis of the detent, a passage extending from the hole to the point portion and longitudinally of the bolt, a pin of uniform section in said passage, a cam element on said pin, and means inside the passage for urging the cam element of the pin against the cam surface of the detent.

6. In a self-locking bolt including a head, a shank, a point portion and a depressible detent in the shank adjacent the point portion, the invention which consists of detent means all parts of which are slidably received in a hole of constant section in said shank substantially at right angles to the longitudinal axis of the shank, said detent being less in length than the depth of the hole, a cam surface on said detent angularly disposed with respect to the vertical axis of the detent, a passage extending from the hole to the point portion and longitudinally of the bolt, a pin of uniform section in said passage, a cam surface on said pin, and means inside the passage for urging the cam surface of the pin against the cam surface of the detent, and means for restraining the outward movement of the detent.

7. In a self-locking bolt including a head, a shank, a point portion and a depressible detent in the shank adjacent the point portion the invention which includes detent means all parts of which are slidably received in a hole in said shank substantially at right angles to the longitudinal axis of the shank, said detent being less in length than the depth of the hole, a cam surface on said detent angularly disposed with respect to the vertical axis of the detent, a passage extending from the hole to the point portion and longitudinally of the bolt, a closure for said passage, a pin of uniform section in said passage, a cam surface on said pin, and means inside the passage between the pin and the closure for urging the cam surface of the pin against the cam surface of the detent, and means for restraining the out-

ward movement of and angular movement of the detent.

8. In a self-locking bolt including a head, a shank, a point portion and a depressible detent in the shank adjacent the point portion, the invention which comprises detent means all parts of which are slidably received in a hole in said shank substantially at right angles to the longitudinal axis of the shank, said detent being less in length than the depth of the hole, a cam surface on said detent angularly disposed with respect to the vertical axis of the detent, a passage extending from the hole to the point and longitudinally of the bolt, a pin of uniform section in said passage, a cam surface on said pin, a spring inside said passage bearing against the pin and means located at the point portion end of the passage for adjusting the tension of said spring.

9. In a self-locking bolt including a head, a shank, a point portion and a depressible detent in the shank adjacent the point portion, the invention which comprises detent means all parts of which are slidably received in a hole in said shank substantially at right angles to the longitudinal axis of the shank, said detent being less in length than the depth of the hole and movable from a locking to a releasing position, a cam surface on said detent angularly disposed with respect to the vertical axis of the detent, a passage starting from the hole and extending to the point of the bolt, a pin of uniform section in said passage, a cam surface on said pin, a spring inside said passage bearing against the pin, said

cam surfaces being so disposed that movement of the pin away from the point moves the detent toward the locking position and a threaded member closing the outside of the passage and confining one end of the spring.

10. A self-locking bolt, including a head, a shank portion, and a point portion, the shank portion having a hole of uniform section extending substantially therethrough, and transverse to the longitudinal axis of the bolt, the bolt having a passage extending from the point portion and terminating in the hole, a detent all portions of which are movable in and out of said hole, a pin of substantially uniform section within the passage and movable therealong, a closure for the outer end of the passage, means between the closure and the pin for urging the pin along the passage, a cam surface on the detent, a cam surface on the inner end of the pin, said cam surfaces being so disposed that movement of the pin away from the point portion of the bolt moves the detent toward the locking position.

11. A self-locking bolt including a head, a shank, and a point portion, an aperture in the shank adjacent the point portion, a detent slidably received in the aperture, said detent having a surface receding from the side of the detent and at an angle thereto, a passage extending from the end of the point portion into the aperture, a pin in said passage and means for urging the pin toward said aperture and in contact with said surface.

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