Chord Pins

Why Recessed Nuts are Used for Chord Pins--Reason for Turning Down the Ends of the Chord Pins--The Use of Washers on Chord Pins

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Recessed nuts are used upon chord pins in pin connected bridges, in order that a perfect bearing may be afforded for each member connected upon them. That this can be accomplished only by using recessed nuts, or by some equivalent device, will be evident from what follows.

Chord pins are made to fit as accurately as possible into the holes drilled through the connected members to receive them, the clearance allowed by the best specifications being generally one-fiftieth of an inch for the pins of less diameter than three inches, and one thirty-second of an inch for pins of greater diameter. If the pins were simply finished to the required size, and threads then cut upon the ends, each end would have much the same appearance as the threaded end of a common bolt.

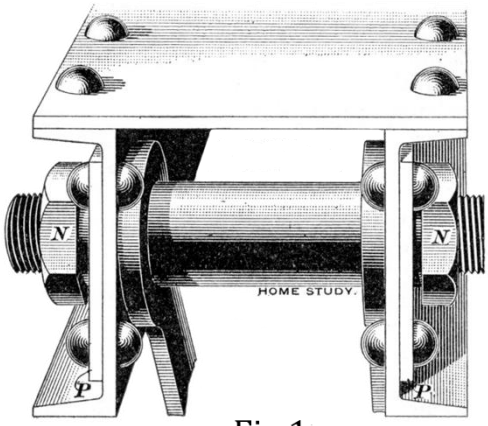

Fig 1.

The extreme outer diameter of the threads would generally exceed the finished diameter of the pin by considerably more than the amount of clearance allowed, and it would be impossible to pass the pin through the pin holes drilled in the members which it is to connect. It, therefore, becomes necessary to turn down the ends of the pin, upon which the threads are to be cut, to a somewhat smaller diameter than the finished portion of the pin, as shown in Fig. 2 and 3. A dome-shaped nut, called a pilot nut, can then be screwed upon the end of the pin to protect the threads, and the pin can be driven readily through the pin holes.

Having seen the necessity for turning down the ends of chord pins, it still remains to be shown why it is not practicable to use ordinary thin nuts upon them. In order to understand the reason why this is not practicable, the fact must be recognized that the unfinished dimensions of bridge members are never exact. Certain parts of bridge members are so finished as to give certain exact dimensions, but nearly all the actual lateral dimensions of each member, being made up by the nominal dimensions of the rolled material of which the members is composed, vary quite appreciably from the nominal dimensions. For the dimensions of rolled material are by no means exact.

If the pin were too long, or more properly, if the actual lateral dimensions of a member were less than the dimensions as calculated in estimating the length of a pin, the result would be as shown for an upper chord pin in Fig. 1. It will be noticed that on account of the pin being too long, the shoulders of the pin prevent the nuts *N*, *N* from being screwed up firmly against the sides of the pins plates *P*, *P*.

But if the pin were too short, that is, if the actual dimensions of the members packed upon it were greater than as calculated in estimating the length of the pin, the result would be similar to the conditions of the lower chord pin *P* shown in Fig. 2. It will be noticed that in this case the outer chord bar *B* does not obtain full bearing upon the pin. In order to clearly show this, the nut on this end of the pin is shown in section.

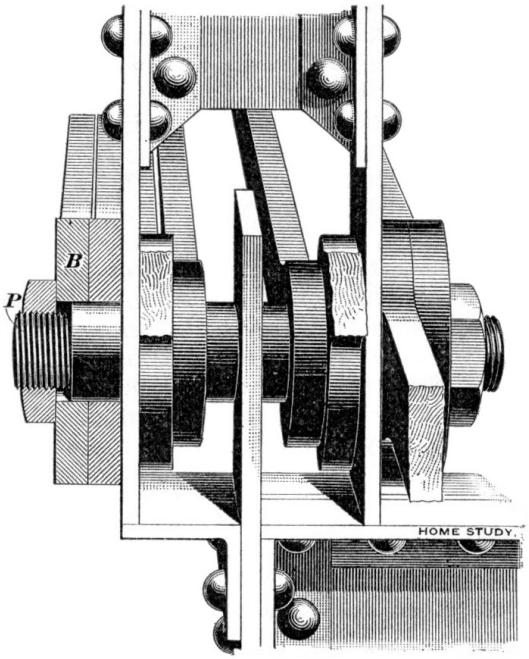

Fig 2

To obviate these difficulties, the practice was inaugurated of making the grip of the pin, *i.e.*, the length of its finished part from shoulder to shoulder, somewhat longer than the estimated grip and using washers fitted over the finished portion of the pin behind the nuts. It will be noticed that if these washers were used on the pin shown in Fig. 1, they would take up the extra length of the pin between the nut *N, N* and pin plates *P,P*. It will make no difference whether the length of the pin and the thickness of the washers be such that the nut can be screwed up tight against the shoulder of the *pin*, or not. All essential conditions will be fulfilled if the grip of the pin, *i.e.*, the length of the finished pin from shoulder to shoulder, be somewhat greater than the exterior dimensions of the member, and still not project beyond each side of the member a distance greater than the thickness of the washer. By screwing up the nuts, the washers may then be pressed firmly against the sides of the member, thus holding the pin in position. It will be noticed that with this device, all members will be given their full bearing upon the pin and the necessary conditions be satisfied whenever the error in the length of the pin is less than the thickness of the washers. If each washer be made a quarter of an inch in thickness, this will permit a variation of nearly a half inch in the width of the member, without disadvantage or the misfitting of the pin. It is evident also that the imperfect bearing shown in Fig. 2, due to variations in the widths of the members, may be obviated by increasing the grip of the pin sufficiently to cover the variations and using washers.

But washers for this purpose were found to be in some respects objectionable. They formed an additional item of expense in the manufacture of chord pins, were liable to get lost, and were inconvenient for the purposes of erection. This led to the idea of making the nut and washer in one piece. As a consequence, a patented recessed pin nut, made of wrought iron, pressed to the required form, appeared upon the market some years ago. It was substantially of the form shown in Fig. 3, and was known as the *Lomas* nut. In the nut shown in this figure, it will be noticed that a recess *r*, on the inner side, permits the nut to be screwed up firmly against the side of the member. This nut at once became very popular as a nut for chord pins, and was quite extensively used. It answered all the purposes of both the nut and washer, as formerly used.

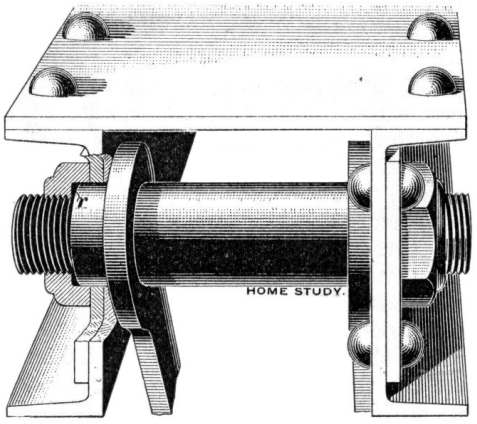

Fig 3

More recently, however, another recessed nut, made of malleable cast iron, has appeared upon the market. The form of this nut is similar to that of the Lomas nut shown in Fig.3. This nut is cheaply produced, and appears to satisfactorily answer all the purposes of a chord pin nut. Consequently, it is at present being quite extensively used for that purpose. Other recessed nuts are also manufactured, but they all involve the same principle and are of the same general form.