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an end to these activities. While the original reason for the fighting is not known, it occurred during an attempt of some of the gang, after having collected the regular week's receipts, to hold up the place and secure the remainder. Of course, when prosecutions of this kind bring such facts into the open through the testimony of witnesses, there results exaggerated fiction and publicity.

4. Any consideration of the activity of the Federal Government against organized vice through the enforcement of the White Slave Traffic Act would not be complete without a statement outlining the manner in which the work of the United States Bureau of Investigation is performed, because it is through the system by which this organization functions that it is possible to cover the entire United States and the entire field of activity with but a comparatively small group of men. The headquarters of this Bureau is at Washington, D. C., and its activities are carried on under the immediate supervision of special agents in charge in each of twenty-two districts (one of which is in Honolulu). Each case as it arises is assigned to a special agent at one of these field offices for attention. Any lead which needs attention in one or more of the twenty-one other districts is forwarded by mail, telegraph, or telephone direct to the other districts, and there this particular lead is assigned to an additional special agent with other cases. Reports of all field investigations are made by each special agent to the Bureau at Washington, and upon receipt they are routed to supervisors for review. In this way the activities of the various districts are correlated and intelligent supervision is afforded from Washington by experts in the type of case under consideration. The special agents are from time to time transferred from district to district, so that local interests play no part in their work. At the same time the maintenance of data in Washington and in the different districts as to the activities of criminals in each section enables the Bureau to keep in immediate touch with conditions throughout the entire country.

ON THE STRENGTH OF PADLOCKS AND HASPS

A. H. GILL¹ AND H. E. SEARLES

In locking up a summer camp, the question arose as to how much force would be necessary to break open the padlock employed, or the hasp or staple through which it passed. A careful search of

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the literature gave only the force required to pull out the screws or nails which might be used to fasten said hasp or staple.²

Padlocks may be divided into at least three classes, according to the form of their shackles.

First. Those having a shackle hinged in the body or ears of the lock—the oldest type. In these the shackle formerly carried a rectangular slot into which a bolt slid inside the lock, as the Bohannon; later models have only a notch on the shackle, now the most common form. In some cases the notch is omitted, the shackle being short and having a locking device at the hinge; in others both this and the notch are used. (Ames Sword Co.'s lock.)

Second. Those having a staple of round wire or rod, carrying slots sliding into the lock, into which slots locking bolts slide within the lock, as the Yale, Corbin and Sargent locks. These are usually of the pin tumbler type.

Third. Those having a flat bar shackle which slides and catches into a corresponding slot in a disk-like body; this renders it practically impossible to force out the shackle by ordinary means. One of the Miller locks is of this class.

Our method of test consisted in holding the body of the lock in a $\frac{1}{8}$ " x $\frac{1}{8}$ " iron loop, slipping a loop of $\frac{3}{8}$ " round iron through the shackle and shutting it into the lock. The loops were then clamped in the jaws of a Universal testing machine and the load applied by the sliding weight on the scale arm in the usual way.

Tests with Locks of the First Type—the Hinge Shackle

To acquire experience, one "Giant" and one "Secure Lever" lock of iron, about two inches across, with cast iron shackles, from the five-and-ten-cent store, were used. The shackles broke about half an inch from the hinge under loads of 260 and 380 pounds respectively.

The older and more familiar type of Yale lock (No. 853) of the lever tumbler type in the two inch size, was next tested. This broke in the lower part of the cast shackle hook at 1630 pounds; the shackle pin sheared at 1730 pounds. Chemical and microscopical analysis of the metal revealed no defects and the bronze was of excellent quality.

Another lock of this same type (No. 585) by the same manufacturer, using a single bitted key working in a slotted rotating

²Mark's "Mechanical Engineer's Handbook."

spindle, broke at 910 pounds, and the pin sheared at 925 pounds; the bronze was of composition and quality similar to the preceding.

An old iron switch lock made by the Bohannon Company was next tested: the brass latch bolt slipped out of the slot at 2890 pounds. This was a used lock and in inferior condition, it is thought a new one might withstand 3500 pounds or more before giving way.

The Miller "new Champion" 6 lever lock broke just above the hinge pin at 865 pounds. A microscopic examination showed defects in the fracture of this particular lock. With a lock that was not defective this lock would probably break at the hook.

Tests with Locks of the Second Type—the Sliding Staple

Yale No. 851 of two inch size in brone was first tested. A corner of the latch bolt inside the lock sheared off at 1855 pounds. The bronze showed itself to be of the usual excellence. Another lock almost identical but by a different manufacturer, broke off the end of the shackle at 810 pounds. The metal below the slot in the shackle was deficient in quantity, and consequently gave way. A lock similar to these was then tested. It is called the Cleveland 4-way, because the key resembles 4 pin-tumbler keys put together with their corrugations outward, forming a cross. It is said to be unpickable. Here the latch-bolt inside the lock sheared off at 1635 pounds and the shackle itself would probably have broken at 1700 pounds.

Tests with Locks of the Third Type—the Sliding Bar

So far as the writers know, these were first made by the Miller Lock Company, of Philadelphia, although they are also produced by others. That they are a most secure type in 6 levers, is evidenced by the fact that the senior author knows of chemical laboratories where more than a thousand have been used nearly for fifty years with no complaints of forcings or pickings. The company is now operated by the Yale and Towne Co. Four of these used locks were tested, breaking at 1825, 1440, 1060 and 1055 pounds; that breaking at 1825 pounds was the only one showing no defects; the area of the break was .09 sq. in.

Tests Upon Staple-like Shackles Alone

Shackles were made of $\frac{3}{8}$ inch brass instead of bronze rod to resemble those in the different locks tested. Slots were filed in them and a piece of soft steel fitted therein and held in position as in a lock