Feb. 16, 1932. E. E. NEAL 1,845,511

HANDCUFF

Filed Nov. 26, 1928

Fig. 1.

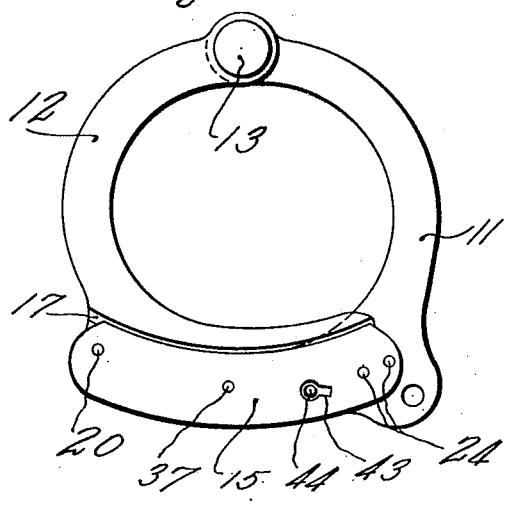


Fig. 2.

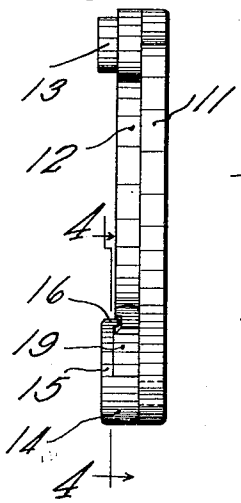


Fig. 3.

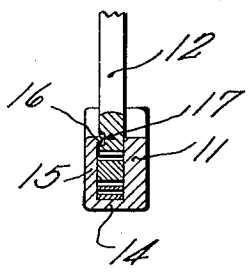


Fig. 4.

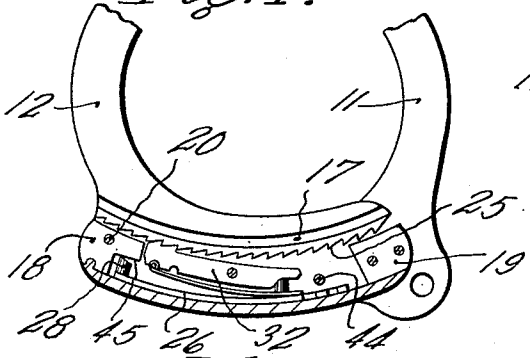


Fig. 5.

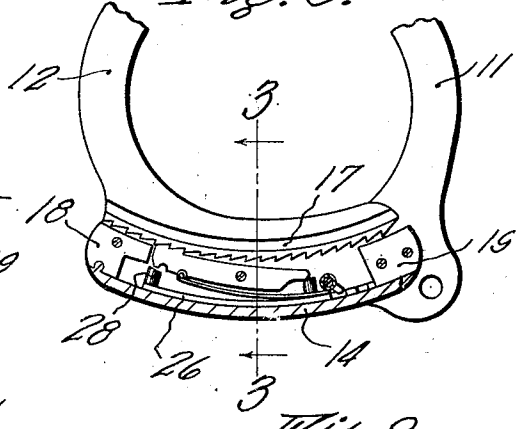


Fig. 6.

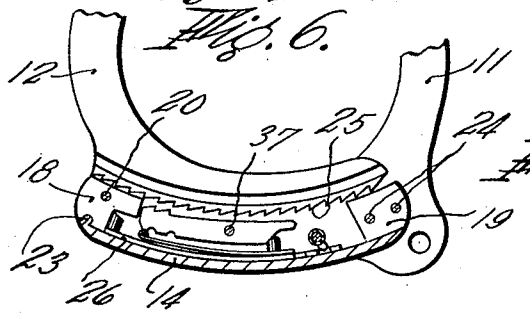


Fig. 7.

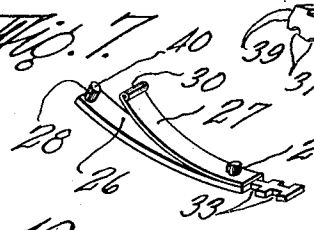


Fig. 8.

Fig. 9.

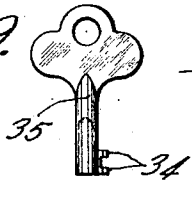
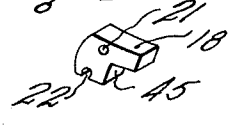


Fig. 10.



INVENTOR.
Elmer E. Neal
BY
Chapin & Neal
ATTORNEYS.

Patented Feb. 16, 1932 1,845,511

UNITED STATES PATENT OFFICE

ELMER E. NEAL, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO PEERLESS HANDCUFF COMPANY, OF SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

HANDCUFF

Application filed November 26, 1928. Serial No. 321,903.

This invention relates to policemen's cuffs, such as thumb, leg and handcuffs adapted for police use. Broadly speaking, the object of the invention is a handcuff combining strength with a degree of lightness and refinement of outline which greatly reduces its undesirable bulk and weight when carried in a policeman's pocket. In furtherance of this object I have devised a handcuff having a lock chamber of very small dimensions, corresponding in magnitude to the other portions of the cuff so that there is no unsightly and bulky bulge in the lock-containing portion. I have also devised a handcuff permitting the use of a single stationary pivot-holding arm and combined with a lock mechanism that cooperates in the elimination of weight. A further object of the invention is to produce a handcuff which cannot be tampered with by the individual handcuffed, either alone or with the aid of a confederate. A further object is to produce a handcuff which cannot be left in an inoperative position when placed in the policeman's pocket.

The manner in which these and other objects are attained will now be described with reference to the accompanying drawings, in which—

Fig. 1 is a plan view of a single handcuff constructed in accordance with my invention, it being understood that in ordinary use the cuff will be joined permanently by a chain to another similar cuff;

Fig. 2 is a side elevation thereof;

Fig. 3 is a transverse section through the cuff when in locked position, taken on line 3—3 of Fig. 5;

Fig. 4 is a longitudinal section through the cuff, taken substantially on line 4—4 of Fig. 2, showing the parts in what will be referred to as the ratcheting position in which the cuff can be closed upon a person's wrist but cannot be opened;

Fig. 5 is a similar section showing the parts in the locked position, in which the swinging arm can be moved in neither direction;

Fig. 6 is a similar section showing the parts in the unlocked position, in which the swinging arm can be moved freely in either direction;

Fig. 7 is a perspective view of the bolt;

Fig. 8 is a perspective view of the locking latch;

Fig. 9 is a detail of the key; and

Fig. 10 is a perspective view of a block which closes the lock chamber.

The handcuff is formed of two curved members, a relatively fixed arm 11 and a swinging arm 12 joined together by a pivot 13. The arm 11 is in this case single, instead of being as in most prior constructions forked so as to embrace both sides of the arm 12. This makes a lighter construction, made feasible only by reason of the exceptionally compact design of the lock chamber which prevents the appearance of local bulkiness and avoids extreme concentration of weight at one point of the cuff. The lock member is formed by a curved side wall 14 and a top wall 15, both preferably integral with the arm 11. The top wall 15 has a rib 16 concentric with the pivot 13 and fitting snugly into a similarly concentric groove 17 in the movable arm 12 over the length of the top wall. This groove and rib construction prevents springing the arms apart, adds rigidity to the cuff when locked, prevents disassembly of the locked parts even though the pivot 13 is removed, and prevents access being had to the lock chamber on that side.

It will be observed that the construction of the lock chamber as described permits it being cut from a solid blank having a single cut through it on an arc from end to end. To close the otherwise open ends of the chamber, blocks 18 and 19 are provided. Block 18 is held in place by a single taper pin 20 passing through a hole 21 in the block and preferably headed over and ground flush with the outside of the lock chamber after assembly, and by a notch 22 in the block fitting over a lug 23 formed integral with the side wall 14 of the lock chamber. With the arm 12 in locked position the block 18 cannot be removed even though the pin 20 be forced out, since the arm 12 prevents the disengagement of the notch 22 from the lug 23. Block 19 is held by two taper pins 24, headed over and ground flush as in the previous case.

By the use of separable end blocks for the lock chamber a definite advantage, directly related to the protection of the lock against picking, is obtained. In previous handcuff constructions it has been the practice to finish after assembly those surfaces of the ends of the lock chamber which are nearest the usual ratchet-toothed portion 25 of the arm 12. This postponement of accurate sizing of the end surfaces has been necessitated by the conflict between the desire to have the smallest possible gap between the ends of the lock chamber and the ratchet teeth 25 and the practical impossibility of getting the requisite accuracy during the manufacture of the individual parts. By forming the end blocks separately they can be made in a series of sizes and the proper ones selected at the time of assembly without necessitating fitting at this time.

The lock mechanism comprises but two moving parts, a bolt shown in Fig. 7 and a latch shown in Fig. 8. The bolt is formed by a curved plate 26 and a spring 27 permanently secured together, the plate having pins 28 and 29 cooperating with the latch as will be described and the spring having a rolled end 30 fitting alternately into recesses 31 in the lower side of the latch 32. At one end of the plate 26 opposed pairs of recesses 33 are cut to permit of the reciprocation thereof by teeth 34 formed upon the key 35. The key interacts with the bolt somewhat after the manner of a pinion engaging a rack, and accomplishes its various locking functions in a plurality of rotations. The bolt slides freely against the side wall 14, needing no further guiding members than the walls of the lock chamber.

The latch 32 is provided with a hole 36 through which passes a pivot pin 37 firmly riveted to the lock chamber and having its ends ground flush to prevent tampering. At one end the latch bears one or more teeth 38 cooperating with the latchet teeth 25 on the movable arm 12, and opposite these teeth is beveled off as shown at 39 (Fig. 8). This beveled surface 39 coacts in certain positions of the mechanism with the beveled end 40 of the pin 28, as will be described. The other end of the latch is cut away at 41, providing a slanting surface 42 cooperating with the outer end of the pin 29. A hole 43 is cut in the wall 15 to admit the key 35, which, in order to render picking of the lock as difficult as possible, is preferably made hollow so as to fit over a pin 44.

The operation of the locking mechanism will now be described. In Fig. 4 the handcuff is shown in what may be referred to as its normal position, having the teeth of the pawl 32 yieldingly engaging the ratchet teeth 25 so that the arm 12 may be rotated counterclockwise as viewed in Fig. 1 but cannot be rotated in the contrary direction. The handcuff can, in this position, be placed on the prisoner's wrist and adjusted to the proper size, where it will be held by the ratchet until, as is usually desirable, the handcuff is double locked or bolted by means of the key. It will be observed that with the parts in the ratcheting position the rolled end 30 of the spring 27 is in the recess 31 nearest the end of the latch, pressing the latter yieldingly against the ratchet teeth 25. The pin 28 lies inactively in a recess 45 formed in the block 18. Pin 29 lies under the cut-away end 41 of the latch, preventing the latch being forced too far out by the spring in case the arm 12 is not in closed position, but otherwise imposing no restriction on its movement.

If now the key be inserted and rotated counterclockwise so that the engagement of its teeth with the recesses 33 will shift the bolt to the position of Fig. 5, the handcuff will be double locked or bolted against movement of the arm 12 in either direction. The pin 28 underlies the toothed end of the latch, its motion into that position having been facilitated by the coaction of the slanting surfaces 39 and 40, and prevents the latch teeth from being withdrawn from the ratchet teeth 25. The pin 29 is still under the cut-away portion 41 of the latch. Since the latch is held against longitudinal movement in the lock chamber by the pivot 37, the rolled end 30 of the spring is drawn out of the end recess 31 by the motion of the bolt, and snaps into the other recess. The key 35 may be withdrawn from the lock with the parts in this position, leaving the arm 12 securely held against movement in either direction.

When it is desired to remove the handcuff from a prisoner's wrist, whether the cuff be in the ratcheting or in the double locked or bolted position, the key is inserted and rotated clockwise. If the parts were in ratcheting position the key is rotated only a portion of a revolution, merely moving the bolt from the position of Fig. 4 to the limiting position of Fig. 6 in which the end of the bolt abuts the end of the recess 45. If the parts were in locked position the key is rotated to carry the bolt first to the ratcheting position of Fig. 4 and then to the unlocked position of Fig. 6. In the latter position the pin 29 has been forced under the slanting surface 42, causing the latch to tilt against the action of the spring until the teeth of the latch and the arm 12 are disengaged. The arm 12 can then be rotated freely in either direction. It might seem that with plate 26 in position shown in Fig. 6 that spring 27 operating on lever 32 would cam plate 26 back to the position of Fig. 4 by pressure on pin 29 from said spring pressed lever. There are two ways to prevent this. First the key 35 might be held in the position shown in Fig. 6 until the arm 12 is drawn back and the prisoner released. But

the preferred way is to provide for sufficient friction between the bottom of plate 26 and the bottom inside wall of the lock casing that spring 27 is not strong enough to slide plate 26 under the conditions stated. Since the unlocking operation and the complete release of pawl lever 32 is accomplished in a short length of time, it is only necessary to hold the parts in the positions shown in Fig. 6 long enough to draw arm 12 backwardly. It should be noted that with the parts in the unlocked position the key (Fig. 6) is in a position in which it cannot be withdrawn from the keyhole. The bolt cannot be moved further to the left (as viewed in the figures) on account of its engagement with the block 18, and movement to the right sufficient to permit withdrawal of the key places the lock in ratcheting position. This feature is of great utility in that it precludes any chance of an officer placing the handcuffs in his pocket in unlocked position, or rather in position where the parts would permit arm 12 to rotate in either direction, in which position the handcuffs would be useless for quick application to a prisoner. When the handcuffs are removed from a prisoner's wrists and the key removed, the handcuffs are necessarily set for application to the next prisoner. Of course it is possible to double lock the handcuffs as in position shown in Fig. 5, when the cuffs would not be in position to apply to a prisoner but there is no necessity or normal operation in which the handcuffs are double locked except when they clasp a prisoner's wrist. But it is extremely important to insure that the handcuffs be carried in condition for immediate application to a prisoner's wrist and to guard against any carelessness in this respect which the described mechanism does.

The design of the lock parts makes unnecessary any substantial depth of the lock chamber. Indeed, the dimensions of this chamber are kept within the same order of magnitude as the dimensions of the two arms 11 and 12. The uniformity of proportions thereby attained not only improves the appearance of the handcuff, but also renders it lighter and less bulky, so that it can more easily be kept in the officer's pocket.

A further advantage of the long and shallow form of the lock chamber lies in the difficulty which would be experienced by the prisoner or a confederate in tampering with the chamber when the handcuff is in place on a prisoner's wrist. Were the chamber deep, as in prior constructions, it would afford opportunity for the application of a hammer or other brute force methods to destroy it, but the nearness of all parts of the present handcuff to the wrist renders such methods almost impossible without injury to the prisoner. A further feature of safety lies in the use of only one stationary arm 11 instead of a pair of parallel spaced arms as in prior constructions. Spaced parallel arms afford opportunity for the insertion of a prying tool by which the lock chamber may be disrupted or the arms broken.

What I claim is:

1. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a latch pivoted within the lock chamber and having tooth means engaging the ratchet teeth on the first-mentioned arm, and a sliding bolt within the lock chamber formed with a part engaging the latch on one side of its pivot to tilt its toothed end away from the teeth on the arm and with a part engaging the latch on the other side of it pivot to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm.

2. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a latch pivoted within the lock chamber and having tooth means engaging the ratchet teeth on the first-mentioned arm, and a sliding bolt within the lock chamber formed with a part engaging the latch on one side of its pivot to tilt its toothed end away from the teeth on the arm and with a part engaging the latch on the other side of its pivot to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm, said bolt also carrying a spring pressing on the latch tending to press its teeth towards the toothed arm.

3. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a latch pivoted within the lock chamber and having tooth means engaging the ratchet teeth on the first-mentioned arm, and a sliding bolt within the lock chamber formed with a part engaging the latch on one side of its pivot to tilt its toothed end away from the teeth on the arm and with a part engaging the latch on the other side of its pivot to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm, said bolt also carrying a spring engageable alternately in a plurality of recesses in the latch, whereby the latch is urged towards the toothed arm and the bolt held releasably against sliding movement.

4. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a spring pressed latch pivoted within the lock chamber and having tooth means normally yieldingly engaging the ratchet teeth on the first mentioned arm, and a sliding bolt within the lock chamber having portions for engagement with a key and formed with a part engaging the latch on one side of its pivot when the bolt is in

one position to tilt its toothed end away from the teeth on the arm and with a part engaging the latch on the other side of its pivot when the bolt is in another position to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm.

5. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a spring-pressed latch pivoted within the lock chamber and having tooth means normally yieldingly engaging the ratchet teeth on the first-mentioned arm, a sliding bolt within the lock chamber having portions for engagement with a key and formed with a part engaging the latch on one side of its pivot when the bolt is in one extreme position to tilt its toothed end away from the teeth on the arm and with a part engaging the latch on the other side of its pivot when the bolt is in the other extreme position to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm, said bolt having an intermediate position in which said parts do not impede ratcheting movement of the latch, a key pivot formed in the lock chamber, said bolt being key operable to its various positions from without the lock chamber.

6. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other arm having a lock chamber, a latch pivoted within the lock chamber and having tooth means normally engaging the ratchet teeth on the first-mentioned arm, a sliding bolt within the lock chamber having portions cut away to form rack-like teeth for engagement with a key, and formed with a part engaging the latch on one side of its pivot when the bolt is in one extreme position to tilt its toothed end away from the teeth on the other side of its pivot and with a part when the bolt is in the other extreme position to positively prevent the toothed end of the latch from moving out of engagement with the teeth on the arm, said bolt having an intermediate position in which said parts do not impede ratcheting movement of the latch, a spring mounted on the bolt and bearing against the latch to press it yieldingly towards the ratchet teeth on the arm, a key pivot formed in the lock chamber, said bolt being operable by a key from without the lock chamber and from one position to another as desired.

7. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other formed with an elongated integral enlargement opposite the pivot, said enlargement being open on the side towards the pivot and at its ends, but closed by integral walls on the other three sides to form a lock chamber, blocks closing the ends of the lock chamber, and locking mechanism within the chamber.

8. A policeman's cuff comprising two curved arms pivoted together, one of the arms bearing ratchet teeth and the other formed with an elongated integral enlargement opposite the pivot, said enlargement being open on the side towards the pivot and at its ends but closed by integral walls on the other three sides to form a lock chamber, blocks closing the ends of the lock chamber, at least one of said blocks having integral tongue and groove connection with an interior wall of the chamber preventing removal of the block when the open side of the chamber is closed by the ratchet bearing arm, and locking mechanism within the chamber.

9. In a policeman's cuff structure a lock casing comprising side, bottom, and end walls, one of said end walls and the bottom wall having integral mutually fitting portions forming a recess in one wall and a projection in the other wall requiring said end wall to be moved at right angles to the bottom wall for assembly and removal to and from end closing position whereby when the top wall of the casing is closed said end wall cannot be removed, lock mechanism in said casing and a locking arm for the handcuff movable to locking position where it forms the top wall of said lock casing.

10. In a policeman's cuff structure in combination a single C-shaped arm, an elongated lock casing conforming in general contour to one end portion of the arm, said lock casing having an opening facing only the other end of the arm and a key hole, a second single C-shaped arm reversely arranged with the first arm and pivoted to the latter at the end opposite the lock casing, said second arm having a lock engaging portion at the end opposite its pivoted end adapted to overlie the lock casing opening and to rotate past said opening, lock mechanism in said casing operable to hold said second arm in overlying position to the lock casing when desired, whereby when locked on a wrist the handcuff structure presents no leverage for a tool to pry its structure apart and all parts of the lock casing lie so closely to the wrist that the casing cannot be struck heavy blows for its destruction without danger to the wrist.

In testimony whereof I have affixed my signature.

ELMER E. NEAL.