Feb. 4, 1947. D. C. MOLLENHOUR 2,415,145

ARTIFICIAL HAND - HOOK TYPE

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Fig. 1.

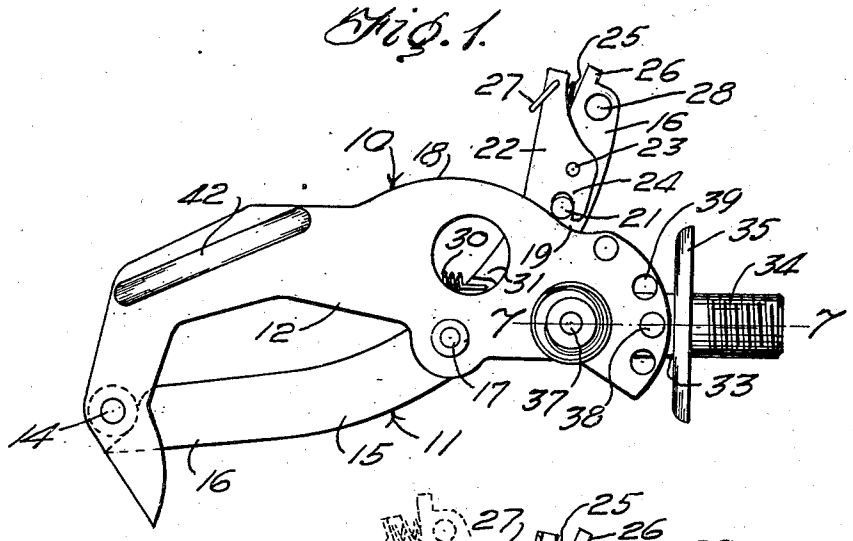


Fig. 2.

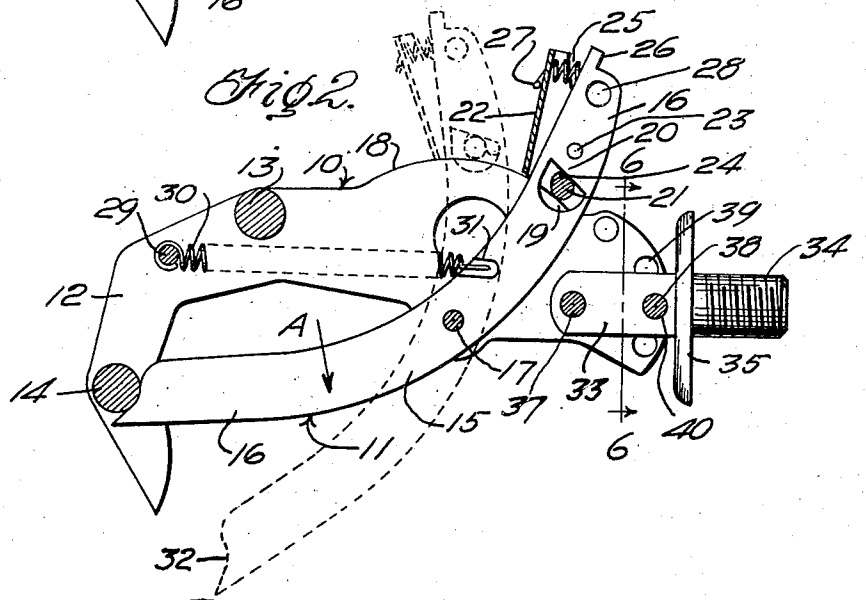
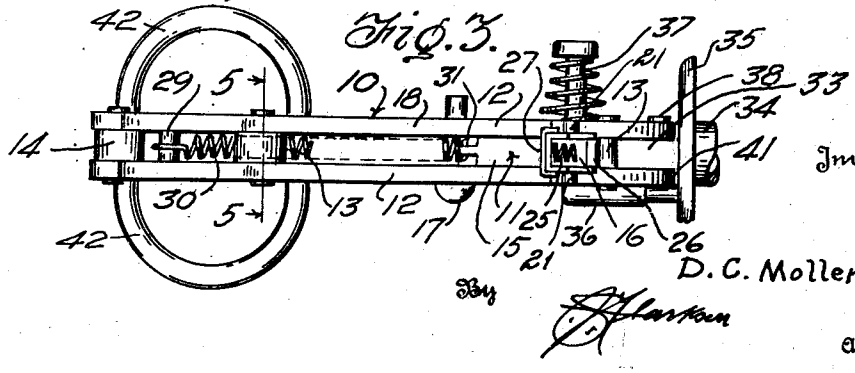


Fig. 3.



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Fig. 4.

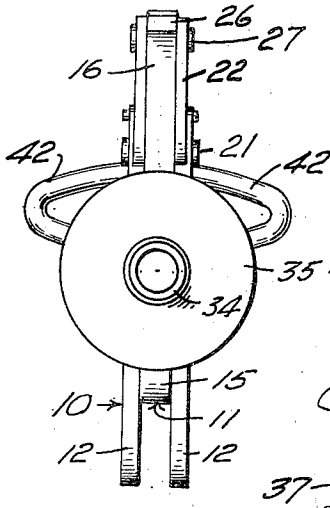


Fig. 5.

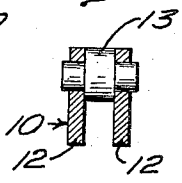


Fig. 6.

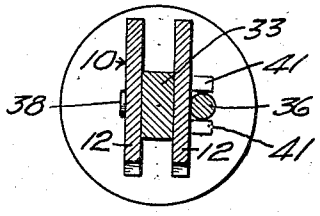


Fig. 7.

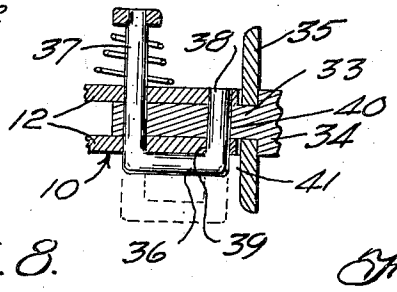


Fig. 8.

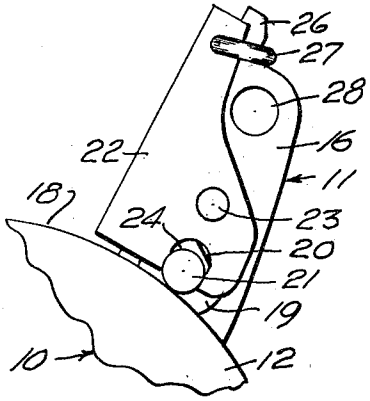
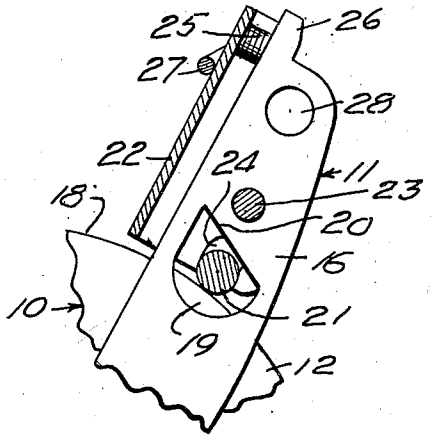


Fig. 9.



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ARTIFICIAL HAND - HOOK TYPE

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Fig. 10.

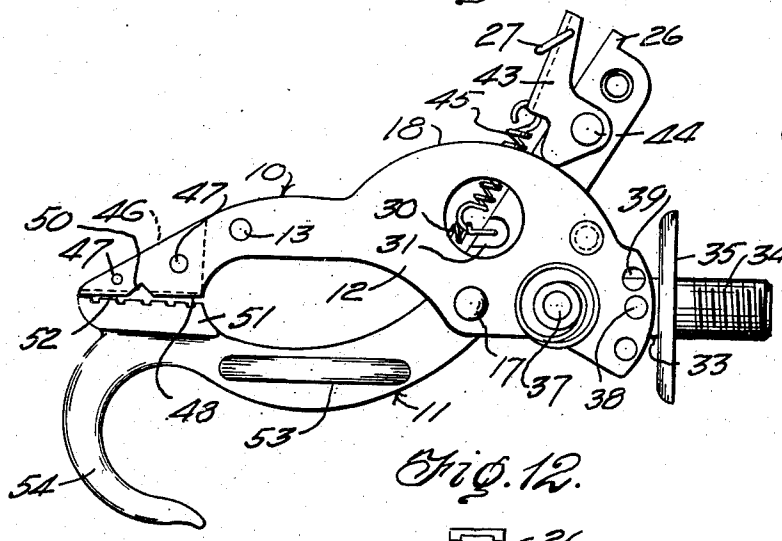


Fig. 11.

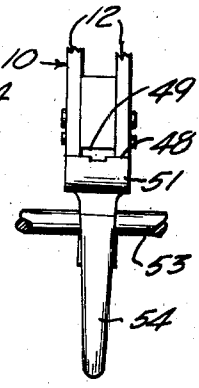


Fig. 12.

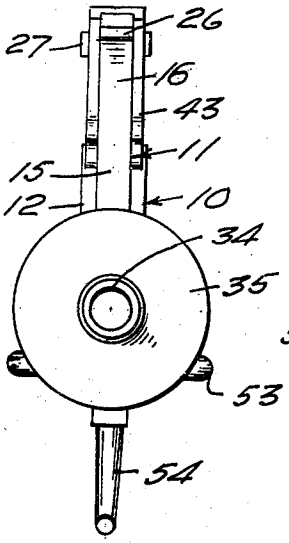


Fig. 13.

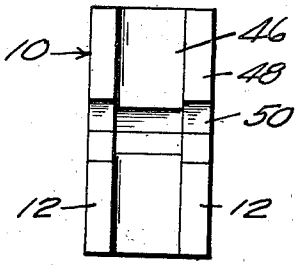
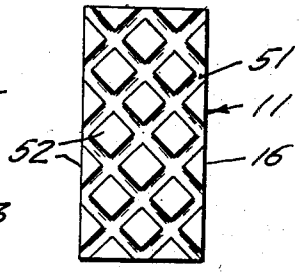


Fig. 14.



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Patented Feb. 4, 1947

2,415,145

UNITED STATES PATENT OFFICE

2,415,145

ARTIFICIAL HAND—HOOK TYPE

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Application January 4, 1945, Serial No. 571,327

10 Claims. (Cl. 3—12)

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This invention relates to artificial hands and has special reference to that type of artificial hand wherein the normal fingers and thumb are replaced by a pair of pivotally connected members acting as gripping tongs.

Certain devices, such as the patent of F. C. Henning 1,365,692 of January 18, 1921, somewhat resemble the present device but it will be noted that in this patent it is necessary to screw up a thumb nut to make the required setting of the gripping tongs and this is a different and inefficient way of operating.

Other inventions of this sort have been heretofore used and it is common to provide in these some sort of pawl and ratchet device for holding the members from opening after they have been adjusted to grip an object. In prior inventions of this character once the article had been gripped it has been necessary to release the pawl and ratchet to such an extent that the device moves to full open position before it can grip another object, even though that object may be smaller than the one first gripped.

One important object of the invention is to provide a friction type lock so as to enable the wearer to grip an object in the jaws without using the opposite hand. Obviously this is a great improvement over the use of a thumb screw where it is positively necessary to use the opposite hand and wherein, in order to get a sufficiently tight grip and prevent slipping, one is apt to strip the threads of the screw.

A second important object of the invention is to provide a device of this character wherein an object may be gripped, the device opened just enough to release that object and then close down on a second and smaller object. All of this being accomplished without any full opening of the jaw of the device.

Also in devices of this character it has been common to provide pawl and ratchet means for preventing the device from opening, such pawl and ratchet means being arranged to hold the jaw at certain definite spaced distances. For instance the pawl may engage in a series of notches.

A third important object of the invention is to provide a device of this character wherein the pawl and ratchet means is such as to enable the jaws to be held in spaced relation against opening at an infinity of positions between the fully closed and fully opened positions of these jaws.

A fourth important object of the invention is to provide novel means for adjusting the hand bodily in relation to its connection with the arm,

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the device thus providing an artificial wrist movement.

The fifth important object of the invention is to provide a device of this character of extreme simplicity and having but few working parts and those of a construction not liable to such wear or damage as will make the device inefficient in operation.

With the above and other objects in view the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views and

Fig. 1 is a side elevation showing one form of the invention.

Fig. 2 is a view partly in elevation and partly in section similar to Fig. 1 but with one of the side members hereinafter described removed.

Fig. 3 is a top plan view of this form of the invention.

Fig. 4 is a rear end view of this form of the invention.

Fig. 5 is a section on the line 5—5 of Fig. 3.

Fig. 6 is a section on the line 6—6 of Fig. 2.

Fig. 7 is a section on the line 7—7 of Fig. 1.

Fig. 8 is an enlarged fragmentary elevation showing the pawl in released position.

Fig. 9 is a view similar to Fig. 8 but with one of the side plates removed.

Fig. 10 is a side elevation of a modified form of the invention.

Fig. 11 is a fragmentary elevation from the front or nose end of the invention in its modified form.

Fig. 12 is a rear elevation of this modified form.

Fig. 13 is a face view of one of the jaws in the modified form.

Fig. 14 is a face view of the other of said jaws.

In the construction of the invention as shown in Figs. 1 to 9 there is provided a pair of members indicated in general at 10 and 11. The member 10 consists of a pair of spaced side plates 12 having general conformation when viewed laterally of the partially flexed fingers and body of a human hand. These members are held in spaced relation by spacers 13 which may be suitably held in position as by welding, rivet or the like. Also, toward the ends of the fingers there is provided a space stop 14 which, as will be presently understood, acts as a stop and gripping jaw. The other member 11 fits between the plates 12 and has a curved body 15 with straight

ends 16. This member 11 is pivoted to the plates 12 by a pivot 17 and the plates 12 each has an arcuate surface 18 concentric to the pivot 17. Adjacent the rear of the member 11 there is provided an opening 19 which straddles the surface 18 and has an outer side as at 20. This outer side is so inclined that it is closer to the surface 18 at its rear end than at its forward end and between the side 20 and the two surfaces 18 is held a pin 21 constituting a frictional pawl in its relation to the surface 18. This pawl operates in such manner that as the member 11 tends to move in the direction of the arrow the end of the side 20 which is closer to the surfaces 18 will engage the pawl and jam it against the surfaces 18 thus locking the member 11 from such movement. However, if the pin 21 is moved toward the opposite side of the opening 19 then the space between the side 20 and the surfaces 18 will be such that the pin will no longer be gripped as the member 11 can swing freely to its extreme position of opening.

In order to effect release movement of the pin 21 there is provided a lever 22 U-shaped in cross section and straddling the rear end 16 of the member 11. This lever is pivoted to the member 11 at 23 and is provided with a notch 24 in each of its sides, these notches engaging the pin 21. The lever 22 is normally biassed by a compression spring 25 located between the upper end portions of the member 11 and the lever 22. This spring normally biasses the lever 22 in such manner that the pin 21 is urged toward what may be termed the narrower end of the opening 19. However, if the lever 22 be pressed, by the fingers or otherwise, against the action of the spring 25 the pin 21 will be urged toward the wider end of the opening 19. Thus the lever 22 normally holds the pin in latching position but may be moved to release the pin. On the extremity of the member 11 is a small lug 26 and pivotally connected to the lever 22 is a latching loop 27 which normally is positioned as shown in Fig. 1 but which, upon the compression of the spring 25, may be swung to the position shown in Fig. 8 thus holding the pin 21 constantly in disengaged position. An opening 28 is provided adjacent the lug 26 for the connection of the wire or cord leading to the usual harness arrangement for devices of this character.

The member 11 is connected, rearwardly of the pivot 17, to a pin 29 carried by the plates 12 at the forward part of the device by means of a coiled tension spring 30. This spring is connected to the member 11 at a reduced thickness portion 31 of said member. As will be seen from Fig. 2 the spring 30 tends to urge the member 11 to swing in the direction of the arrow A, the action of this spring being normally resisted by the pawl 21. At the forward end of the member 11 there is provided a notch 32 which engages with the member 14, this forward end slipping between the plates 12 to effect such engagement. Under these circumstances any object, such as a pencil, placed between the finger tip portions of the plates 12 and resting against member 14 may be held in such position by movement of the member 11 in the direction opposite that shown by the arrow A. This movement may be effected by proper movement of the harness or may be manually performed if the user has one hand remaining.

Extending rearwardly from between the plates 12 is a bar 33 which carries on its rear end a screw threaded portion 34 by means of which it may be attached to a threaded socket such as

is commonly used on the forearm of a person whose hand has been amputated. A stop plate 35 is welded or otherwise secured at the forward end of the screw 34. A U-shaped pin 36 has one long leg 37 which passes through the forward end of the bar 33 and through the plates 12 to act as a pivot on which the plates and member 33 may pivot in relation to a screw 34. Thus U-shaped pin 36 also has a short leg 38. The plates 12 are provided with a series of holes 39 spaced on a line concentric to the pivot leg 37. Similarly the bar 33 has a hole 40. The short leg 38 is adapted to pass through the hole 40 and through selected holes 39 in the plates 12 thus locking the hand portion of the device in wrist adjusted relation to the screw 34. In order to hold the short leg 38 from movement out of registration with the hole 40 there is provided on the disc 35 a pair of lugs 41 between which this leg 38 slides.

Loops 42 are carried by the plates 12 and may be used in steadying the hand when laid on a surface, in fastening a package or the like thereto and in various other ways, such as holding in straight position objects such as pencils, chisels, etc.

In the form of the invention shown in Figs. 10 to 14 the construction is substantially the same with the exception that a different form of jaw and a different pawl arrangement is used. In this pawl arrangement a lever 43, U-shaped in cross section has its sides straddling the member 11 as before and these sides are pivoted to said member 11 by a pivot 44. The end of this lever toward the pivot 17 engages directly on the surfaces 18, the lever being slightly biassed so that the engaging ends lie forwardly of a line connecting the pivot 17 and the pivot 44. In place of the compression spring 25 there is employed a tension spring 45 which has one end hooked to the forward part of the lever 43 and its other end engaging in one of the coils of the spring 30 as clearly shown in Fig. 10.

At the forward end of the member 10 the plates 12 have inserted between them a block or spacer 46 which is secured in position by rivets 47. This spacer is so positioned as to lie slightly above the lower edges of gripping jaws 48 formed on the under side of the forward ends of the plates 12. This facing provides a notch 49 running longitudinally of the device and also a transverse notch 50 is cut across the block 46 and the plates 12 as shown clearly in Fig. 13. The member 11 has its forward end flattened to provide a width equal to the width between the outer surfaces of the plates 12 and this flattened portion forms a jaw 51 which has its upper surface provided with suitable corrugations 52 as shown clearly in Fig. 14. In this form of the device the loops 53 are carried by the member 11 and this member 11 is prolonged forwardly to form a re-bent hook 54 which may be used in carrying heavy weights.

Referring now to Fig. 2 it may be assumed that in the dotted line position there shown an article has been gripped which will be held tightly between the member 14 and the forward end of the member 11. When it is desired to release this article it is merely necessary to compress the spring 25 tightly by movement of the lever 22 and to allow the forward end of the member 11 to move slightly in the direction of the arrow A. The object grasped will be released and upon releasing tension on the spring 25 the member 11 will be held against further opening. A smaller object may then be placed in position for gripping between the member 14 and the forward end of

the member 11. Obviously the operation of the form shown in Figs. 10 to 14 will be identical so for as it being unnecessary to open the jaws to their fullest extent for grasping an object.

What is claimed is:

1. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, and a friction pawl and ratchet device having coacting parts associated with respective members and resisting movement of said members to open said jaws.

2. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, and a cylindrical gripping member for clamping movement on said arcuate surface by the other member and frictionally traversing said surface, said last member acting against the action of said spring.

3. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical friction pawl supported for clamping movement on said arcuate surface by the other member and traversing said surface, said pawl acting against the action of said spring, and manually operable means for relieving the pawl from active cooperation with said surface.

4. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical gripping member for clamping movement on said arcuate surface by the other member and frictionally traversing said surface, said last member acting against the action of said spring, and releasable latch means for holding said gripping member from active contact with said surface.

5. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical gripping member for clamping movement on said arcuate surface by the other member and frictionally traversing said surface, said last member acting against the action of said spring, manually operable means for relieving the gripping member from active cooperation with said surface, and releasable latch means for holding said pawl from active contact with said surface.

6. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, a friction pawl and ratchet device having coacting parts associated with respective members and resisting movement of said members to open said jaws, attaching means for securing one of said members to a user's arm, a pivot connecting said attaching means to the last mentioned member, said last member having a series of spaced pin holes on a line concentric to the last pivot, said attaching means having a pin hole registerable selectively with said pin holes, a pin engaging the registering pin holes, and means to release said pin from an engaged hole upon pressure of the means against a hard surface.

7. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical friction pawl supported for clamping movement on said arcuate surface by the other member and traversing said surface, said pawl acting against the action of said spring, attaching means for securing one of said members to a user's arm, a pivot connecting said attaching means to the last mentioned member, said last member having a series of spaced pin holes on a line concentric to the last pivot, said attaching means having a pin hole registerable selectively with said pin holes, a pin engaging the registering pin holes and means to release said pin from an engaged hole upon pressure of the means against a hard surface.

8. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical friction pawl supported for clamping movement on said arcuate surface by the other member and traversing said surface, said pawl acting against the action of said spring, manually operable means for relieving the pawl from active cooperation with said surface, attaching means for securing one of said members to a user's arm, a pivot connecting said attaching means to the last mentioned member, said last member having a series of spaced pin holes on a line concentric to the last pivot, said attaching means having a pin hole registerable selectively with said pin holes, a pin engaging the registering pin holes and means to release said pin from an engaged hole upon pressure of the means against a hard surface.

9. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, a spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a cylindrical friction pawl supported for clamping movement on said arcuate surface by the other member and traversing said surface, said pawl acting against the action of said spring, releasable latch means for holding said pawl from active contact with said surface, attaching means for securing one of said members to a user's arm, a pivot connecting said attaching means to the last mentioned member, said last member having a series of spaced pin holes on a line concentric to the last pivot, said attaching means having a pin hole registerable selectively with said pin holes, a pin engaging the registering pin holes.

10. In an artificial hand, a pair of pivotally connected members having coacting jaws at their forward ends, spring means urging said jaws apart, one of said members having a portion provided with an arcuate surface concentric with the pivotal axis of said members, a friction pawl carried by the other member and traversing said surface, said pawl acting against the action of said spring, manually operable means for relieving the pawl from active cooperation with said surface, releasable latch means for holding said pawl from active contact with said surface, at-

taching means for securing one of said members to a user's arm, a pivot connecting said attaching means to the last mentioned member, said last member having a series of spaced pin holes on a line concentric to the last pivot, said attaching means having a pin hole registerable selectively with said pin holes, a pin engaging the registering pin holes and means to release said pin from an engaged hole upon pressure of the means against a hard surface.

DELBERT CLARK MOLLENHOUR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,029,794	Corley	June 18, 1912
1,284,875	Caron	Nov. 12, 1918
1,365,692	Henning	Jan. 18, 1921