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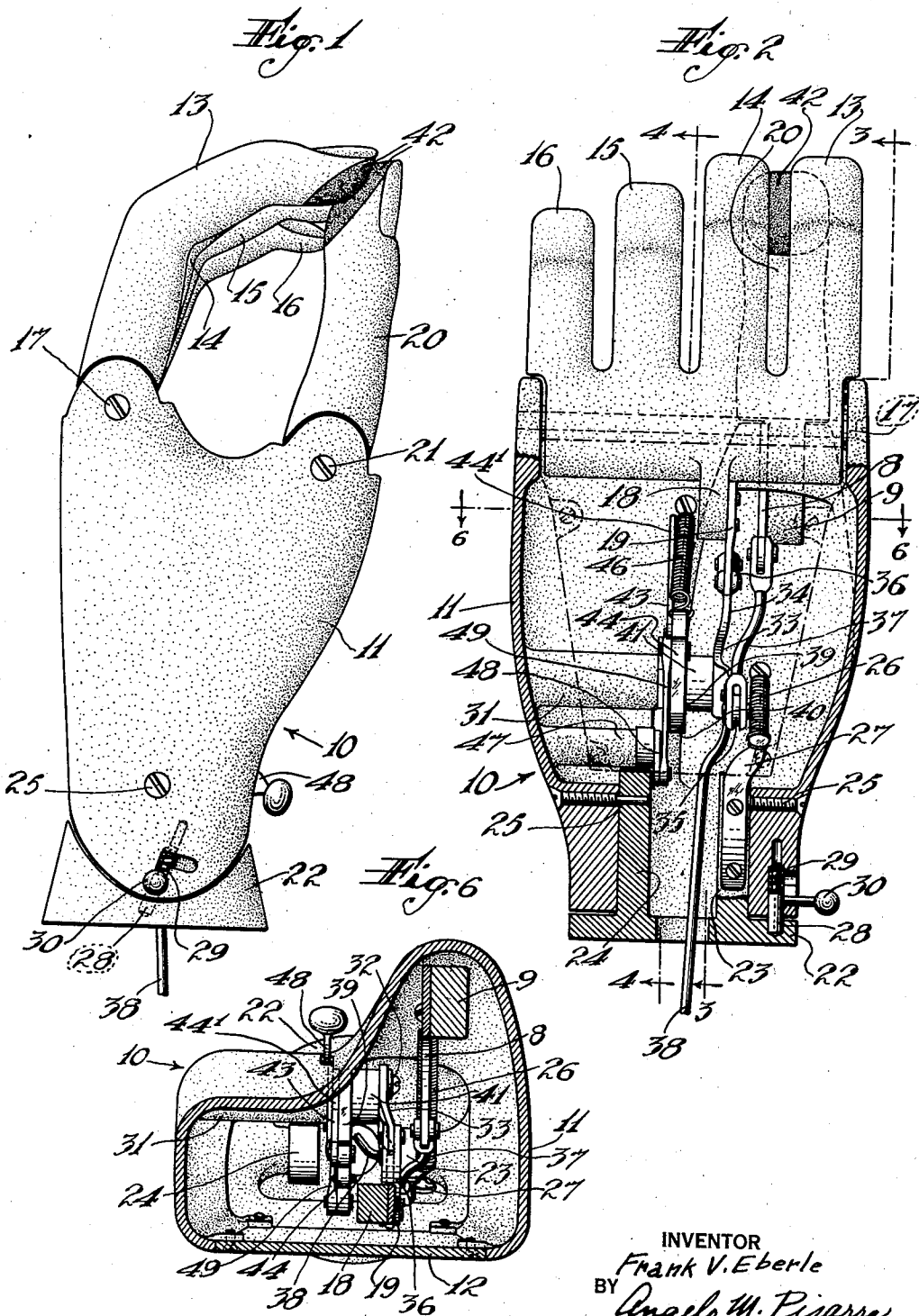
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2,230,378

ARTIFICIAL HAND AND WRIST ASSEMBLY

Filed June 26, 1939

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Fig. 3

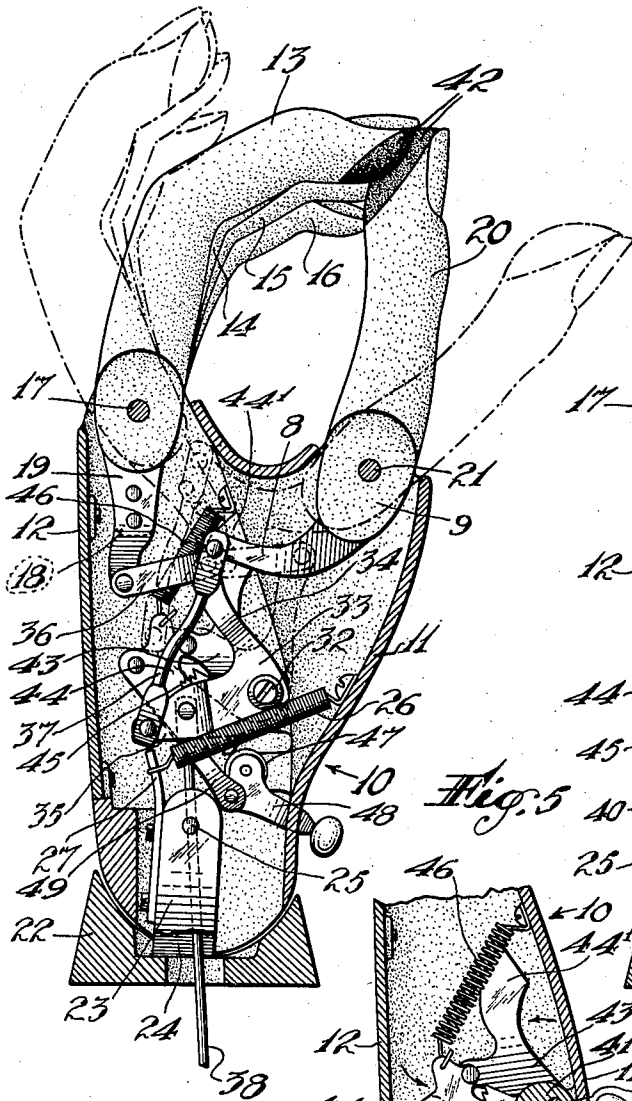


Fig. 4

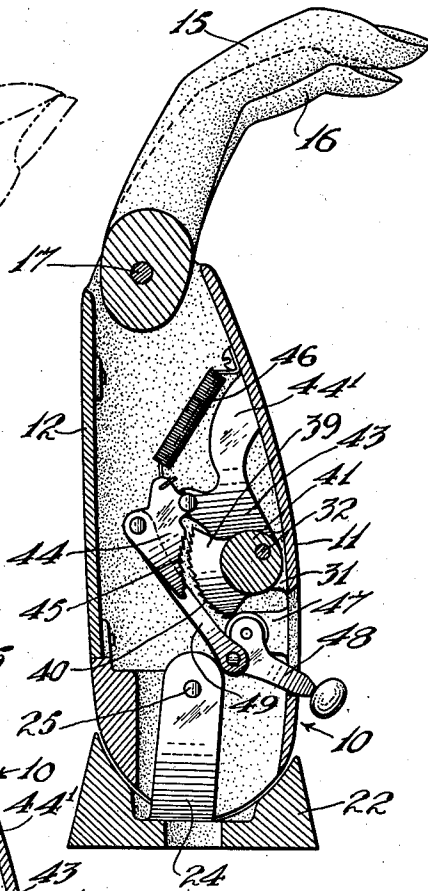
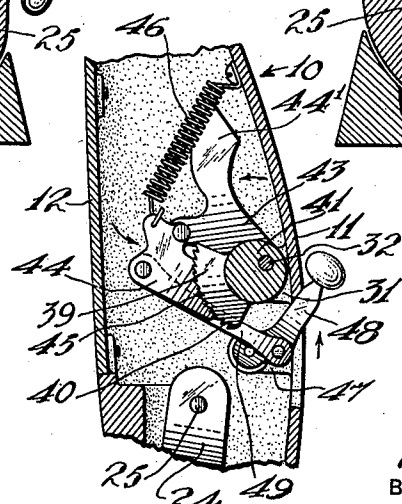


Fig. 5



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ARTIFICIAL HAND AND WRIST ASSEMBLY

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2 Claims. (Cl. 3—12)

This invention relates to artificial limbs and more particularly to an improved hand and wrist assembly. The primary purpose of the invention is to provide an artificial hand which is rugged and reasonably simple and economical to manufacture and also to provide the novel hand and wrist assembly.

Figure 1 represents a side elevation of the improved hand and wrist assembly embodying the invention.

Figure 2 represents a top elevation of the device shown in Figure 1 with a portion thereof cut away so that the parts located within the interior of the hand shell may be seen.

Figure 3 is a cross-sectional view taken on line 3—3 of Figure 2.

Figure 4 is a cross-sectional view taken on line 4—4 of Figure 2.

Figure 5 is a fragmentary cross-sectional view illustrating the relative positions of the parts of the locking device when in operative or "locking position."

Figure 6 is a cross-sectional view taken on line 6—6 of Figure 2.

Referring to the drawings, 10 represents a hand and a portion of a wrist. The hand comprises a hollow or shell member 11 open at the back, which opening is closed by a cover plate 12 which may be fixedly or removably secured to the member 11 in any appropriate manner.

I prefer that it be removably secured to member 11 in the event that one desires to make any adjustments of the moving parts located in member 11. The front part of the body 11 has an opening therein into which extend the knuckle portions of four fingers 13, 14, 15 and 16. The knuckle portions of the four fingers may be integral with each other and the fingers proper may be spaced from each other as shown. Extending through an elongated opening in said knuckles and secured to the sides of member 11 at the front portion thereof is a shaft 17 about which said fingers may be pivotally swung or rotated in unison. Integral with said knuckle portions and depending therefrom is a projection or boss 18 to which is secured an extension 19. At the front part of the member 11 there is a projecting portion which has a slot therein accommodating a projection 9 integral with a thumb 20. The projecting portion 9 extends into the hollow member 11 and the thumb extends outside of hollow member 11 and it is pivotally mounted on the hollow member 11 by pin 21 which extends through the juncture of the thumb 20 and projection 9 and is secured to

hollow member 11 at a place near said slot. Extension 8 is secured to projection 9.

In order that the hand may be disposed at an angle to the vertical axis thereof, there is provided a supporting member 22 having a concave recess in which is located the convex side of the lower end of the hand and wrist assembly member 11.

At the center of said member 22 are upstanding spaced members 23 and 24 integral with member 22 and extending into the large opening in the lower end of member 11. A pair of aligned pivotal pins 25 are mounted in the lower end of the member 11 and extend within the opening thereof and said pins 25 extend through openings in said members 23 and 24 whereby the member 22 can be rotated with respect to member 11 and about said pins as an axis. A coiled tension spring 26 has one end thereof secured to the interior of hollow member 11 and its other end secured to a projecting member 27 anchored to member 23. This spring 26 normally tends to rotate said member 11 about the pins 25 and dispose said member 11 at an angle to member 22. In order that the member 11 may be maintained in such a position that its longitudinal axis is coincident with the axis of the support 22, and also so that the member 11 may be locked in its angular position, the support 22 is provided with a plurality of openings adapted to accommodate a pin 28 located in an opening in the lower part of member 11 and normally forced outwardly by spring 29. The pin 28 has a short pin 30 with a knob extending through a bayonet slot in the side of the member at the lower end thereof. In operation when it is desired to change the angular position of the hand, the pin 30 is moved upwardly to remove pin 28 against the action of spring 29 out of the opening in member 22 and it is rotated into the small opening of the bayonet slot where it remains.

The member 11 is moved with respect to member 22 and the pin 30 is pushed out of the upper end of the bayonet slot and the spring 29 automatically forces pin 28 into the opening in support 22 located therebelow.

Integral with the member 11 and secured thereto at the inner surface thereof is a boss 31 to which is secured a pivot or axis 32. Mounted on the outer part of axis 32 is a V-shaped actuator 33 through whose apex extends axis 32. The V-shaped actuator comprises a pair of arms 34 and 35 located in approximately the same plane as projection 19. A link 36 is loosely piv-

oted to the end of arm 34 and projection 19, and a link 37 is loosely pivoted to the end of arm 35 and the projection 8 so that upon actuation of the V-shaped actuator the links 36 and 37 are simultaneously actuated to move simultaneously said finger assembly and thumb towards or away from each other depending upon the direction of movement of the V actuator, controlled by to and fro movement of a rigid element 38 extending through support 22 and into member 11. Also mounted on said axis 32 is a toothed segment 39 having teeth 40 in its outer periphery, extending towards the upper part of member 11. Located between segment 39 and V actuator is a thick disc 41 integral with said segment and actuator and eccentrically mounted on axis 32 whereby said disc 41 and segment 39 are actuated in unison with the V actuator.

In order that the fingers and thumbs may be locked in position and especially so that a very firm grip may be provided between the ends of the first two fingers and the end of the thumb which have rubber or other resilient inner tips 42 which are adapted to meet each other, I provide the locking mechanism which is so firm that a sheet of paper located between the thumb and two first fingers may be held so tightly that when locked, the paper cannot be removed therefrom without tearing the same. Independently actuable and pivotally mounted on axis 32 is a member 43 having integral therewith a stop arm 44. A locking member toothed pawl 44 is pivotally mounted on the outer end of member 43 and is in the same plane as the segment. The lower edge of member 44 is close to and in contour complementary to the outer edge of segment 39, with teeth 45 extending in a direction opposite to teeth of segment 39. A tension spring 46 has one end anchored to the upper part of hollow member 11 and its other end secured to the member 44 and normally tends to rotate the member 44 in a direction away from the segment 39. A boss 47 is located rearwardly of boss 31 and is integral with member 11. Pivotally mounted on boss 47 is an L shaped actuator 48, one end of which extends through a slot in the palm of member 11, and its other end is loosely pivoted on one end of a link 49 whose other end is loosely pivoted on the pawl 44. The actuator 48 is pivotally mounted on the boss 47 at one end of the small arm of said L member.

In operation the spring 46 pulls the pawl 44 out of engagement with the segment 39 and the arm 44 downwardly a small distance until it bears against the inner part of shell 11 whereupon the fingers 13, 14, 15 and 16 may be moved towards or away from thumb 20 depending on the direction of application of force to the actuating member 38.

Assuming that the user desires to grip an article, the element 38 is pulled in a direction away from the member 11 and in so doing the V actuator acting through the links 36 and 37 actuates the thumb and fingers towards each other to grip that article. It is obvious that since the member 38 is ordinarily actuated by a muscle of the shoulder or arm that only a small degree of force may be exerted between the fingers and thumb and therefore objects of any considerable weight cannot be normally held between the fingers and thumb even if they are locked in the position to which they have been actuated by

movement of member 38. When the locking mechanism herein disclosed is actuated, it first brings the fingers and thumb closer together and then locks them in this new position. Upon actuation of the L shaped member 48 the same is rotated about its pivot and pulls the link 49 downwardly and rearwardly and pulls the pawl 44 downwardly whereupon its teeth intermesh with the teeth of segment, and it also pulls the stop upwardly and against the action of spring 46 whereupon the segment actuates the V actuator which through links 36 and 37 brings the fingers and thumb closer together.

When the lock arm 48 reaches its upper degree of travel, the link 49 and arm are either in dead center or to that side of dead center where there is a strong locking of the fingers and thumb which cannot be disturbed except upon downward movement of said arm.

Although the invention has been described in detail, it is not to be limited to the exact construction shown, because it is subject to modifications and changes within its scope.

I claim:

1. An artificial hand comprising a body member, a plurality of fingers and a thumb pivotally mounted on said body member, an axis secured to said body member, a V actuator mounted at its apex on said axis, links pivotally mounted at the ends of said V actuator and connected to said fingers and thumb, means for rotating said V actuator on said axis to move said fingers relative to said thumb, a toothed segment pivotally mounted on said axis and connected to said V actuator for simultaneous rotation therewith, means, other than said first means, for actuating said V actuator to move said fingers relative to said thumb and to lock said fingers and thumb in position, said second means including a pivoted toothed member adapted to be moved into and out of engagement with said segment, a finger actuable link pivoted to said body member and extending through an opening therein and a link connecting said toothed member and said finger actuable link to said toothed member.

2. An artificial hand comprising a body member, a plurality of fingers and a thumb pivotally mounted on said body member, an axis secured to said body member, a V actuator mounted at its apex on said axis, links pivotally mounted at the ends of said V actuator and connected to said fingers and thumb, means for rotating said V actuator on said axis to move said fingers relative to said thumb, a toothed segment pivotally mounted on said axis and connected to said V actuator for simultaneous rotation therewith, a stop link pivotally mounted on said axis, a toothed element pivotally connected to said stop link between the ends of said stop link, a finger actuable link pivotally mounted on said body member and extending through an opening therein, a link pivotally connected to said finger actuable link and said toothed member, resilient means tending to swing said toothed member away from said segment and to maintain said stop link against said body, said finger actuable link adapted to swing said toothed member into engagement with said segment, to act against said spring and to rotate said segment and V actuator and to automatically lock itself against accidental release.

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