

June 6, 1944.

J. A. Q. COSTA

2,350,339

ORTHOPEDIC ARM

Filed Nov. 23, 1942

2 Sheets-Sheet 1

Fig. 1.

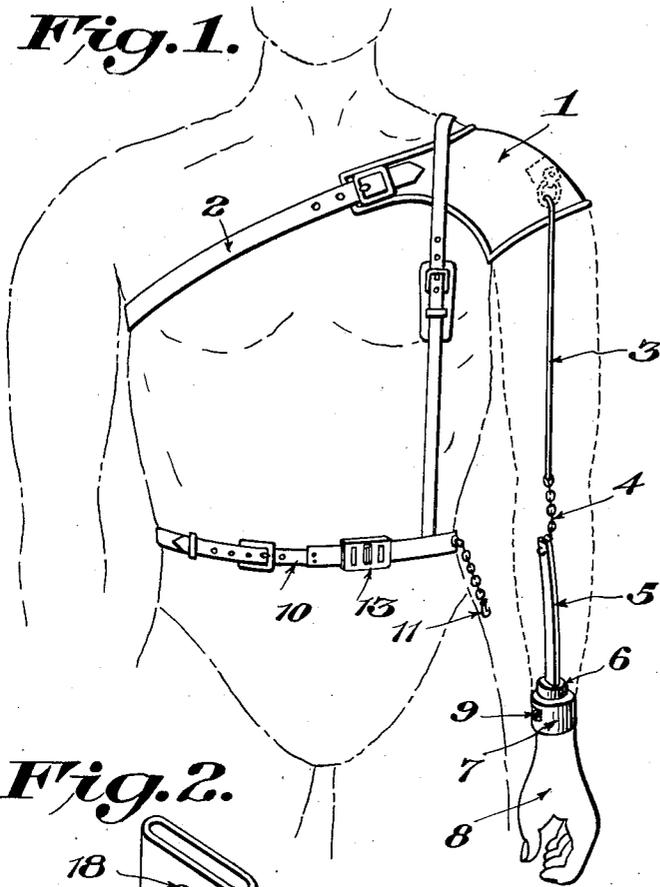


Fig. 3.

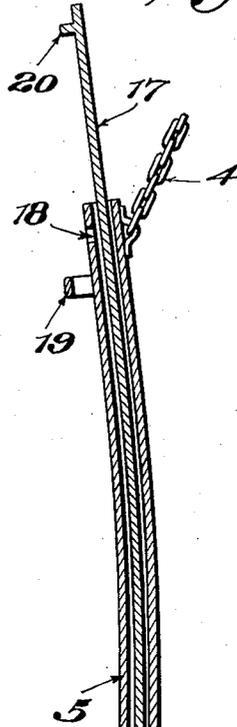


Fig. 2.

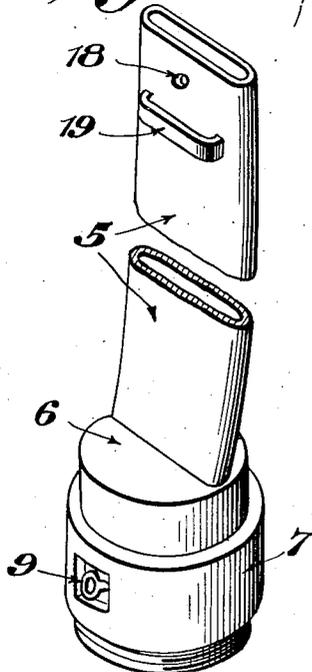
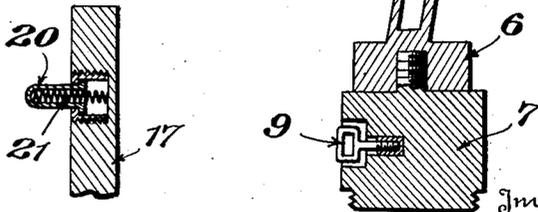
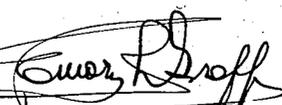


Fig. 4.



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Fig. 5.

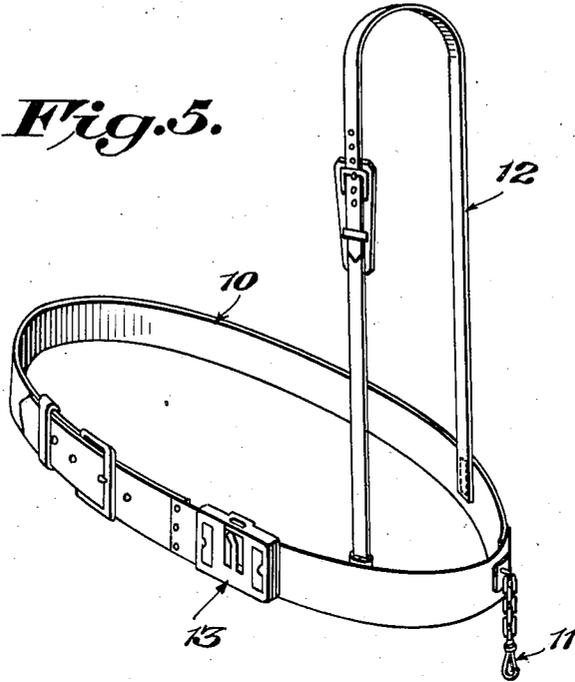


Fig. 7.

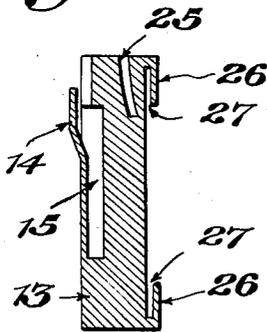


Fig. 6.

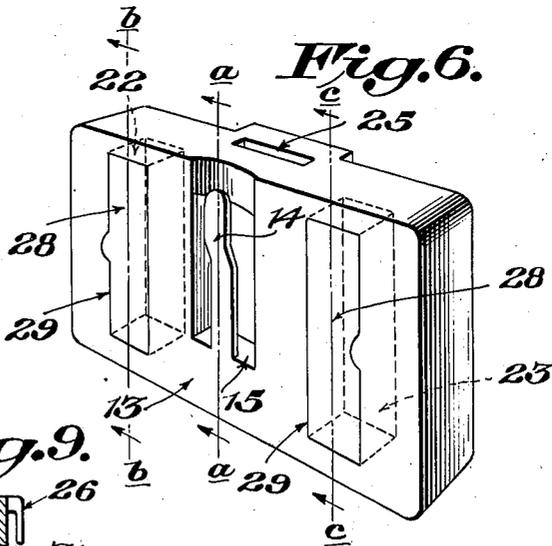


Fig. 8.

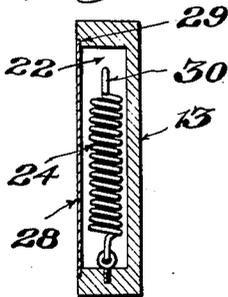
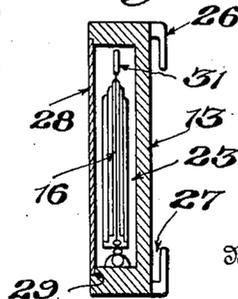


Fig. 9.



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UNITED STATES PATENT OFFICE

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ORTHOPEDIC ARM

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4 Claims. (Cl. 3—12)

This invention relates to improvements in artificial arms.

A primary object of the invention is to provide a structure including a biceps element and a forearm element joined by a flexible connection and which may be suspended from a shoulder support, and also have either the flexible elbow connection or the lower end which receives an artificial hand selectively connected to a body encircling girdle or belt, thereby to enable the user to manipulate the arm in a natural and satisfactory manner.

In order that the invention may be clearly understood and carried into practice without difficulty, a preferred embodiment of the same has been shown, by way of example, in the accompanying illustrative drawings, wherein:

Figure 1 illustrates an orthopedic arm in accordance with the invention, with its means of support and suspension in position on the human body.

Figure 2 is a perspective on an amplified scale of the forearm.

Figure 3 shows a sectional view of the same.

Figure 4 illustrates an amplified detail of the same.

Figure 5 is a perspective of the sustaining girdle with the means for supporting and eventually fixing the forearm and wrist.

Figure 6 is a perspective, on an amplified scale, of the slider used for supporting the wrist, and

Figures 7, 8 and 9 show transversal sections on the lines *a-a*, *b-b* and *c-c* of said Figure 6.

Similar numbers of reference have been used to indicate like or corresponding parts in all the views.

With reference to said figures and by way of example of a concrete form of construction, the general principles of which may be applied to the several cases, the invention will now be described as applied to an amputation of the left arm at the shoulder. In accordance therewith, from the shoulder of a coat (Fig. 1), or from a shoulder pad or plate *f*, conveniently supported, for instance, by means of an adjustable strap *2*, extends a rod *3*, preferably formed by a wire and corresponding in length to that of the arm, to the free end of which is connected by means of a flexible and detachable connection *4*, another rod, formed by a flat elongate rigid sheath *5*, which takes the place of the forearm. The connection *4* replaces the elbow and may be attached to a special girdle, of a construction later to be described. There is thus provided a point of support for the forearm at the waist line, on

the hip, to which end a corresponding opening will be provided at the sleeve of the coat or other wearing apparel used instead.

The forearm *5* is formed at its fore end with a tapped block *6* for screwing on the wrist *7* of the hand *8*, which latter may be of any suitable type, independently of this invention. The wrist *7* is provided with means *9* preferably in the form of an eye for supporting the same on the sliding member provided on the girdle, at a position near the navel.

The rod *3*, besides serving as a support when the limb is pending from the shoulder piece, has for its object to give the appearance of the presence of an arm in the sleeve, to which end said rod is covered with a suitable soft and light filling material, in order to obtain the required volume.

The forearm *5*, besides its connection to the arm, is suspended from a special belt or girdle *10*, at the level of the hip by means of a suitable flexible anchor connection *11* including a swivel hook. A suspender *12*, adapted to pass over the shoulder, may be connected to the girdle, in order to endow the forearm and hand with an increased degree of strength in the case of said limb being used as a hook for carrying a bag, package, or any other object.

The sustaining belt or girdle *10* is closed at the front. It is provided with a swivel hook *14* or similar device above the left hip, for suspending and supporting the forearm. The said girdle is constructed, along part of its circumference, of suitable metal and adapted to fit the abdomen.

The girdle is further provided, on its metallic part, with a slider block *13*, to which is connected the wrist by means of the device *9*. Said slider block *13* carries a spring tongue *14*, Figure 8, housed in and secured to a recess *15* by one of its ends, while the other end may be connected to the hand.

The slider is also provided with an extensor cord or device *16*, adapted to be connected to the hand in order to maintain the same conveniently spaced from the body.

By means of the foregoing three devices, viz: the supporting means, the spring and the extensor, three different objects are attained; in the first place, from an aesthetic point of view, the support of the limb; in the second place, a dynamic effect of attraction toward the body by the spring, and in the third place, another dynamic effect, of a centrifugal nature, namely the compound swinging movement of the entire arm

resulting from the shoulder suspension and the tethering effect of the extensor.

Said slider also cooperates with a device which enables the forearm to take a position of rest, from the elbow, on the abdomen, by means of an additional blade 17, slidably inserted in the sheath which forms the forearm, so as to allow the same to extend to a height at the level of the face of the user. The forearm 5 consists, as before stated, of a hollow metallic rod or sheath, provided near one of its ends, on the side in contact with the body, with a hole 18 and an offset strap 19, for engagement with the device 11 of the girdle.

The metallic rod or blade 17 which slides within the sheath of the forearm, is provided at each end with a spring operated detent 21, adapted to enter into the hole 18 and thereby determine two fixed end positions, in one of which the blade 17 is retained in the interior of the forearm sheath, being supported at the slider 13, so that the hand 8 may extend to the level of the face of the user.

Said slider 13 is provided, as already stated, with a hook 14 which projects beyond a recess 15 and is also formed with recesses 22 and 23, in which are respectively mounted a spring 24 and the extensor 16. At the top, the slider 13 is formed with recess 25, for a purpose later to be explained, and is further provided on its back with folded down flanges 26 which form a slot 27 wherein the slider may slide along the girdle.

If desired, the recesses 22 and 23 may be provided with cover plates 28, adapted to slide in guide ways 29. The spring 24, mounted in the recess 22, carries at its upper end a ring 30 and the extensor 16 is also provided with a ring 31, for attachment to the wrist 7 by means of the extensible hook 9.

From the foregoing it will be seen that in accordance with the invention, supporting elements have been provided whereby the forearm or the hand may be made to rest on the girdle, at the height of the hip, or on the abdomen, at the level of the navel, in the case of prosthesis of the upper limbs.

An orthopedic arm arranged and constructed as above described may be used, with the assistance of the right hand, for performing many functions of collaboration, such as the holding of a glass, of a work tool, shooting with a rifle, handling of spectacles, execution of delicate operations in work shops, performance of personal hygiene, handling of the reins when riding and numerous other operations, such as eating with both hands, which constitutes a convenient example of making use of the artificial arm and hand according to this invention.

The discovery of the use of means for supporting the limb on the girdle, on the hip and on the abdomen, constitutes a main feature of the invention which besides its aesthetic value, resolves a great many problems relating to the convenient and useful use of the hand.

The particular embodiments of the invention above described and shown in the accompanying drawings, are to be considered as mere examples and it should be understood that the invention is not limited to the same, but that many modifications of shape, detail and arrangement may be introduced without departing from the scope of the same, such as clearly defined in the claims annexed to this specification.

Having now clearly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim as new and desire to secure by Letters Patent is:

1. An artificial arm structure, including in combination, body engaging supporting means comprising a waist encircling girdle and a shoulder plate, a biceps rod movably connected at its upper end with the shoulder plate, a rigid forearm member, a flexible elbow connection between the lower end of the biceps rod and the upper end of the forearm member, an artificial hand supporting element on the lower end of the forearm member, a flexible anchor carried by the girdle and having means at its free end to detachably engage the upper end of the forearm, a slider block shiftably mounted on the girdle, and means carried by the artificial hand supporting element for connecting with said slide to support the forearm member at the waistline.

2. An artificial arm structure according to claim 1 wherein the forearm member is a tubular sheath provided with spaced keeper means, a blade slidably adjustable in the sheath from a position substantially coextensive therewith to a projected extended position, and yielding detents carried by the blade for selectively engaging said keeper means.

3. An artificial arm structure according to claim 1 wherein the slider block is provided with a spring tongue to engage said means carried by the artificial hand supporting element, said block also having recesses at each side of said tongue, a coil spring in one of said recesses and an extensor cord in the other, said spring and cord each individually constituting a selective point of attachment for said means in addition to said tongue.

4. An artificial arm structure, comprising, in combination, a shoulder plate and a waist encircling belt adapted for attachment to the body, an artificial arm structure suspended from the shoulder plate and comprising relatively rigid biceps and forearm portions joined by a flexible elbow connection, a flexible element permanently secured at one end to the belt and having means at its other end for detachably engaging said flexible elbow connection to tether the mid-portion of the arm structure to the belt, a member slidably adjustable on the belt, and a plurality of means carried by said member for selective engagement with the lower end of the arm structure.

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