

1,365,646.

Patented Jan. 18, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

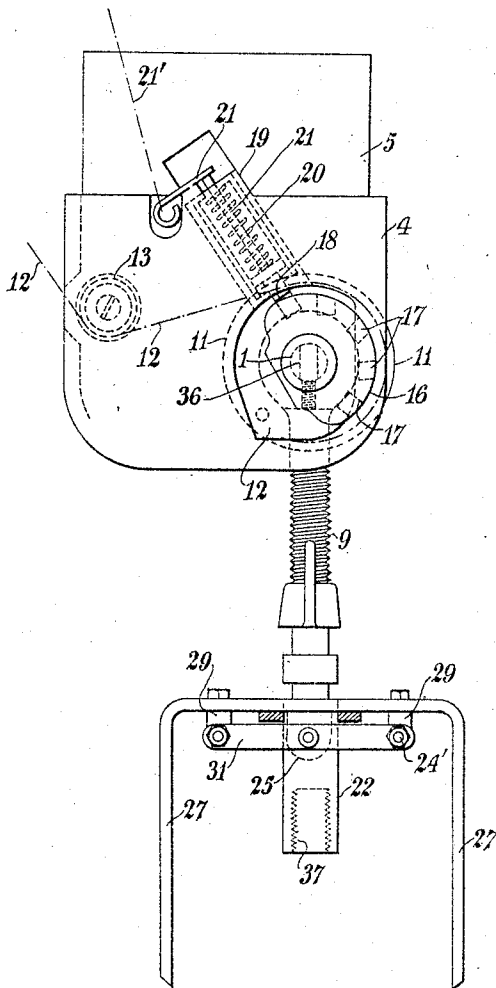
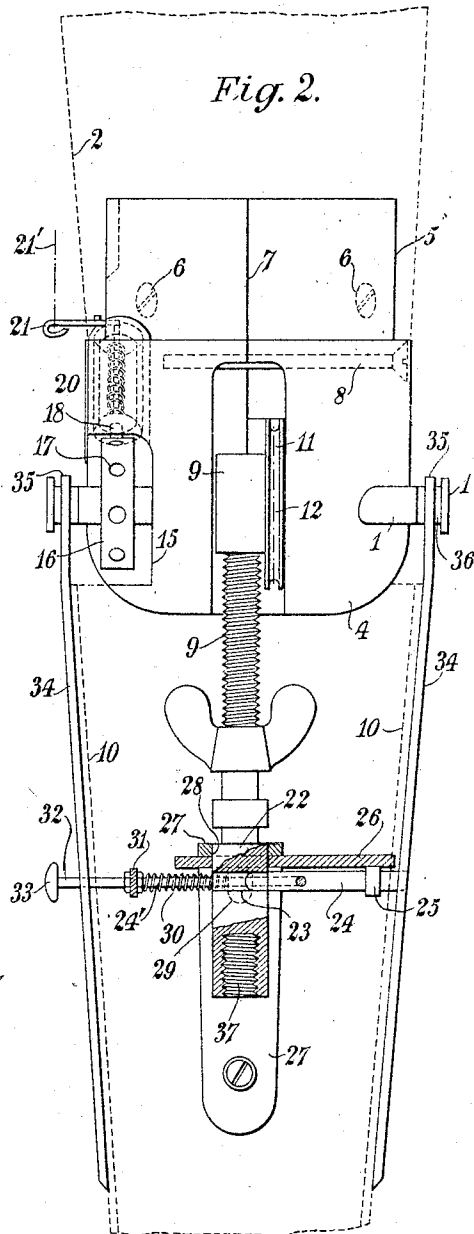


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

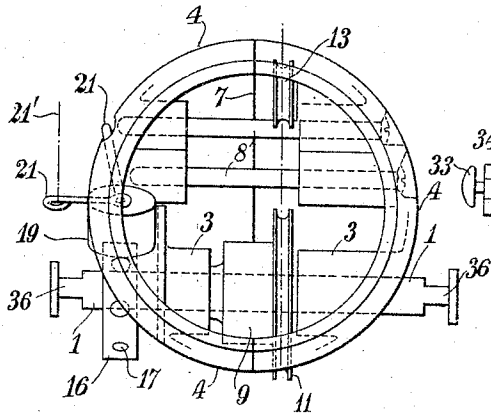


Fig. 4.

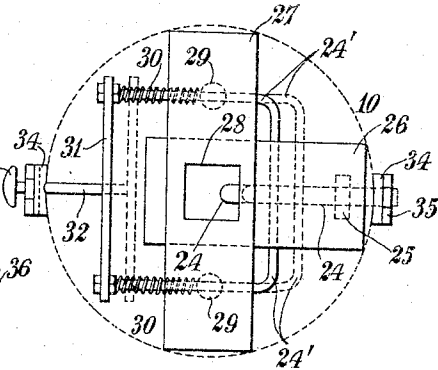


Fig. 5.

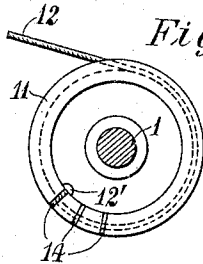


Fig. 7.

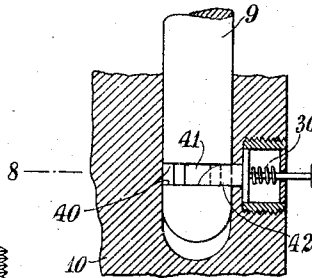


Fig. 8.

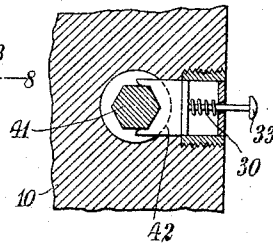


Fig. 6.

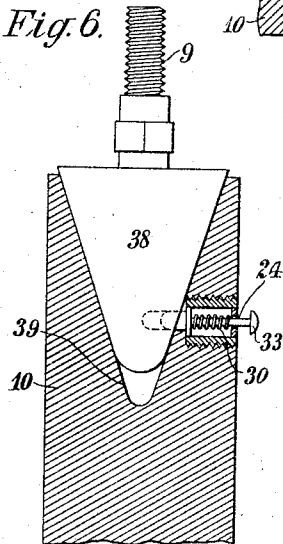
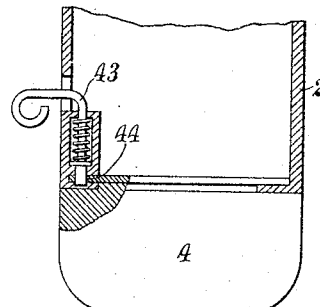


Fig. 9.



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3 SHEETS—SHEET 3.

Figure 1 is a perspective view of a person wearing the prosthetic arm assembly. The assembly includes a shoulder strap (2), a control lever (12) on the upper arm, a circular control knob (9) on the forearm, and a wrist joint (10). Other components labeled include 21, 16, 33, and 34.

Alfred C. Adams.

by *E. J. J. J. J.* Atty.

UNITED STATES PATENT OFFICE.

ALFRED CHARLES ADAMS, OF ROEHAMPTON, LONDON, ENGLAND.

ARTIFICIAL LIMB.

1,365,646.

Specification of Letters Patent.

Patented Jan. 18, 1921.

Application filed August 20, 1918. Serial No. 250,747.

To all whom it may concern:

Be it known that I, ALFRED CHARLES ADAMS, a subject of His Majesty the King of England, and resident of Roehampton, in the county of London, Kingdom of England, have invented certain new and useful Improvements in Artificial Limbs, of which the following is a specification.

This invention relates to improvements in artificial limbs.

The invention has for its object to provide an improved mechanically worked shoulder or elbow joint to which may be fitted a lower forearm member, with or without a hand or an extension piece for appliances.

According to the chief feature of this invention one or more members of the artificial limb turn on a pivot pin mounted eccentrically and forwardly of the vertical axis of the limb so that for instance a forearm member can be turned and raised upwardly without altering the position of the upper arm.

A further feature consists in providing means whereby the lower part or bucket of a two-part forearm is adapted to be automatically locked to the upper part thereof to connect the two parts together.

The invention will now be described with reference to the accompanying drawings in which:—

Figure 1 is a side elevation of one form of elbow joint constructed according to this invention showing the device unlocked;

Fig. 2 is a sectional front elevation thereof;

Fig. 3 is a plan of the cup shaped casting;

Fig. 4 is a plan of the locking mechanism disposed in the forearm;

Fig. 5 is a detail of the pulley wheel and the operating cord attachment;

Fig. 6 is a sectional elevation of a modified construction of the connecting members;

Fig. 7 is a sectional elevation of a further modification.

Fig. 8 is a sectional plan taken on the line 8—8 of Fig. 7.

Fig. 9 is a diagrammatic view of a modified method of fitting the casting to the lower end of the upper arm to allow the forearm and connection to be rotated.

Figs. 10 and 11 are respectively rear and front views showing the improved artificial limb in use.

In my preferred construction as shown in Figs. 1 to 4, I mount the pivot pin 1 eccentrically and forwardly of the vertical axis of

the upper arm in a pair of bearings 3 preferably formed in a hollow casting 4 adapted to be secured to the lower end of the said upper arm. This casting or stump 4 is substantially hemispherically or cup shaped at its lower end and reduced in diameter at its upper end as shown at 5 so that it may be inserted and secured by screws or the like 6 in the lower end of the artificial upper arm bucket 2 of leather or other suitable material. The hollow casting or stump 4 is preferably made of aluminium and divided longitudinally as shown at 7 in two portions which are adapted to be secured together by screws 8 or other suitable means. Between the bearings 3 and on the pivot rod 1 are secured a preferably screw threaded stem member 9 to which is attached the forearm 10 in the manner to be hereinafter described and a grooved pulley wheel 11 or other suitable means to which is secured one end of a cord, or the like 12 which is adapted to operate the forearm 10, working through suitable jockey rollers 13 or guides. The other end of this cord 12 is adapted to be worked by a forward movement of the remaining stump of the arm or by a pull from the opposite shoulder or the chest in the well-known manner. This cord 12 is preferably adjustably secured to the grooved pulley 11 by a screw engaging in one of a plurality of holes in the pulley or by providing a number of holes or recesses 14 in the pulley 11 into one of which the end of the wire 12 is adapted to be engaged, a suitable enlargement 12' being provided on the end of the wire to hold the same in position as shown in Fig. 5. Thus the cord can be easily removed and replaced by a new cord if necessary and repairs easily effected. Adjacent to one end of the pivot rod 1, and disposed in a recess or cut away portion 15 of the said casting 4, is secured a disk or quadrant 16 having a plurality of holes 17 arranged on its periphery. A longitudinally movable pin 18 is disposed obliquely in a suitable enlargement 19 of the wall of the casting 4 and adapted to be normally pressed downwardly by a spring 20 to engage in any one of the holes 17 provided on the disk 16 so that the forearm 10 can be locked in various positions with relation to the upper arm 2. The spring pressed pin 18 is formed with an upwardly and outwardly projecting stem 21 to which may be attached in any suitable manner a cord or the like as indicated at 21' for operating the pin 18 to

unlock the joint. The said cord 21' may be worked from either the shoulder or the chest of the wearer in well known manner as desired. The upwardly projecting portion of the stem 21 is adapted to ride in a hole cut in the casting 4 and the outwardly projecting portion is adapted to project through a suitably cut away portion of the said member communicating with the said hole. A recess or the like is cut in the casting, to one side of the before-mentioned cut away portion so that the outwardly projecting portion of the stem 21 of the pin can be turned and placed therein. The pin 18 can thus be held out of engagement with the holes 17 in the disk 16 so as to permit free movement of the forearm 10.

It will be understood that the said stem 21 may be operated by the other hand to unlock or lock the forearm 10 in any position about the pivot 1.

To the lower end of the screw threaded stem member 9 is secured a suitably shaped or squared extension piece 22 having a transverse hole or recess 23 which is adapted to receive a spring pressed pin 24 slidably mounted in the artificial forearm bucket member 10 so that the forearm bucket can be instantly, and if so desired, automatically secured to the upper arm bucket 2. In one construction, this pin 24 is slidably mounted in bearings or a bearing 25 secured or formed on a plate 26 which is secured to a U shaped plate 27. These plates 26 and 27 are each provided with a suitably shaped or squared hole 28 to receive the extension piece 22 and the arms of the U shaped plate 27 are secured by suitable means to the forearm bucket 10. To the pin 24 is secured immediately of its ends a U shaped rod 24' which is slidably mounted in bearings 29 depending from the U shaped plate 27 and on the arms of the U shaped rod 24' are mounted coiled springs 30. One end of each of these springs 30 is adapted to bear against one of the bearings 29 and the other end of each spring 30 is adapted to bear against a plate 31 adjustably secured to the outer ends of the U shaped rod 24'. To this latter plate 31 is secured a rod 32 which is adapted to extend through the forearm bucket 10 and be provided with a suitable operating knob or the like 33. Thus it will be seen that when the forearm bucket 10 is placed on the stem member 9 and the squared or suitably shaped end 22 thereof engages in the squared hole 28, the spring pressed slidable pin 24 will automatically engage in the transverse hole 23 in the said squared extension 22 and lock the forearm 10 thereto. To each side of the forearm bucket 10 are secured in any suitable manner metal plates or the like 34 provided with extensions 35 to engage with the outer ends of the pivot pin 1. Each extension 35 is preferably forked to engage with a sub-

stantially rectangular shaped portion 36 formed adjacent to the ends of the said pivot pin 1 so as to further secure the forearm bucket 10 to the upper arm bucket 2 and allow the former to move in relation to the latter when operated by the cord or wire 12. In order to remove the forearm bucket 10 it is only necessary to press the external knob 33 to withdraw the spring pressed pin 24 from engagement with the stem member 22 and thus unlock the connection. If desired the spring pressed pin 24 could be arranged so that the knob 33 could be pulled to unlock the forearm 10.

Thus it will be seen that I have provided a connection for the forearm stem member and forearm bucket which can be quickly and easily secured and automatically locked and be instantly detachable. If desired, the lower end of the squared extension 22 could be formed with an internal screw thread 37 for the connection of a suitable attachment. It will also be observed that by mounting the pivot pin 1 eccentrically the forearm 10 can be turned thereon and raised upwardly and locked either automatically or by hand in the manner hereinbefore described without altering the position of the upper arm.

In a modified construction as shown in Fig. 6 the stem member 9 could be provided with a cone shaped extension 38 to engage in a conical recess 39 formed in the forearm bucket 10 or vice versa, a spring pressed pin 24 or pins being provided to lock the connection in a similar manner to that previously described.

If desired, as shown in Figs. 7 and 8, the lower end of the forearm stem member 9 may be provided with a recess 40 having a hexagonal or other angular shaped base 41 to receive a suitably forked spring pressed plate 42 in place of the pin to automatically lock the forearm 10 thereon.

In a further modified construction as shown diagrammatically in Fig. 9 the lower end of the upper arm or the hollow casting 4 could be rotatably mounted in the bucket 2 and be locked in any position by a spring pressed pin or plunger 43 provided on one portion engaging in one of a plurality of holes 44 provided on the other portion, or the previously described angular bases recess and spring pressed forked plate connection similar to that shown in Figs. 7 and 8 may be provided to lock the members 2 and 4 at desired angles to each other.

When my invention is applied to a shoulder joint the pivot pin therefor is arranged eccentrically and forwardly of the vertical axis of the limb.

What I claim is:—

1. An artificial limb, comprising an upper arm bucket, a transverse pivot pin carried by the arm bucket, a forearm, straps

secured to the forearm and having detachable engagement with the transverse pivot pin, a stem-member secured to the transverse pivot pin and provided with a notch, a U-shaped plate extending longitudinally of the forearm and secured thereto and having an opening to receive the stem-member, and a spring pressed bolt to enter the notch and lock the stem-member within the opening.

2. An artificial limb, comprising an upper arm bucket, a transverse pivot pin carried by the arm bucket, a forearm, straps secured to the forearm and having their ends forked to receive portions of the pivot pin, a stem-member secured to the transverse pivot pin and provided with a notch, a U-shaped plate extending longitudinally of the forearm and secured thereto and having an opening to receive the stem-member, a second plate secured to the U-shaped plate and having an opening in registration with the first named opening, a bolt carried by the second plate and adapted to enter the notch, a spring pressed element secured to the bolt and arranged within the forearm, to enter the notch, and a manually operated element secured to the spring pressed element and arranged exteriorly of the forearm.

3. An artificial limb, comprising an upper member, a transverse pin pivoted within the upper member and having its ends formed polygonal, a lower member, straps secured to the lower member and having their ends forked to receive the polygonal portions of the pin, a socket secured to the lower member, and a stem-member secured to the pin and adapted to be inserted within the socket and locked therein.

4. An artificial limb, comprising an upper member, a transverse pin pivoted within the upper member and having its ends formed polygonal, a lower member, straps secured to the lower member and having their ends forked to receive the polygonal portions of the pin, a socket secured to the lower member, a stem member secured to the upper member for insertion within the socket, means to lock the stem-member within the socket, and means to hold the pin against turning movement with relation to the upper member.

5. An artificial limb comprising an upper member, a lower member, a pivot pin in the upper member to which the lower member is connected at a plurality of points, and means for operating said lower member about the pivot pin, said pivot pin being mounted transverse the upper member and wholly in advance of and parallel to the transverse central plane of the upper member, whereby the lower member may be turned upwardly on said pivot pin throughout substantially the full movement of a normal arm without requiring movement of the upper member.

6. An artificial arm, comprising an upper arm bucket, a pivot pin fixed therein transverse the bucket and forwardly of the axial line thereof, a fore arm, means for connecting said fore arm with the respective ends of the pivot pin, and means for connecting the fore arm with the pivot pin between its ends, and an operable connection for the pivot pin arranged adjacent said last mentioned means.

In testimony whereof, I have hereunto signed my name.

ALFRED CHARLES ADAMS