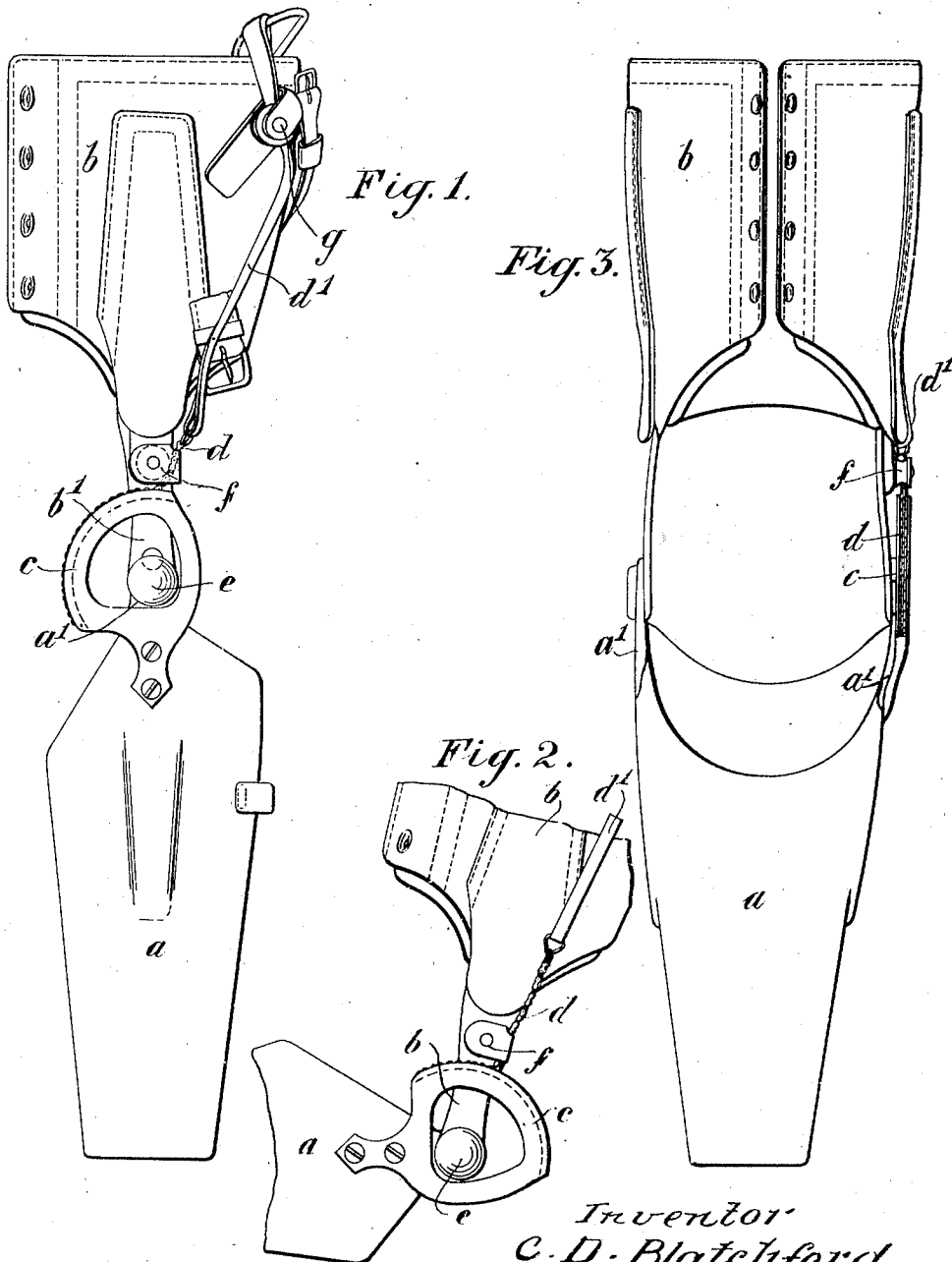


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ARTIFICIAL LIMB.
APPLICATION FILED JAN. 21, 1918.

1,334,834.

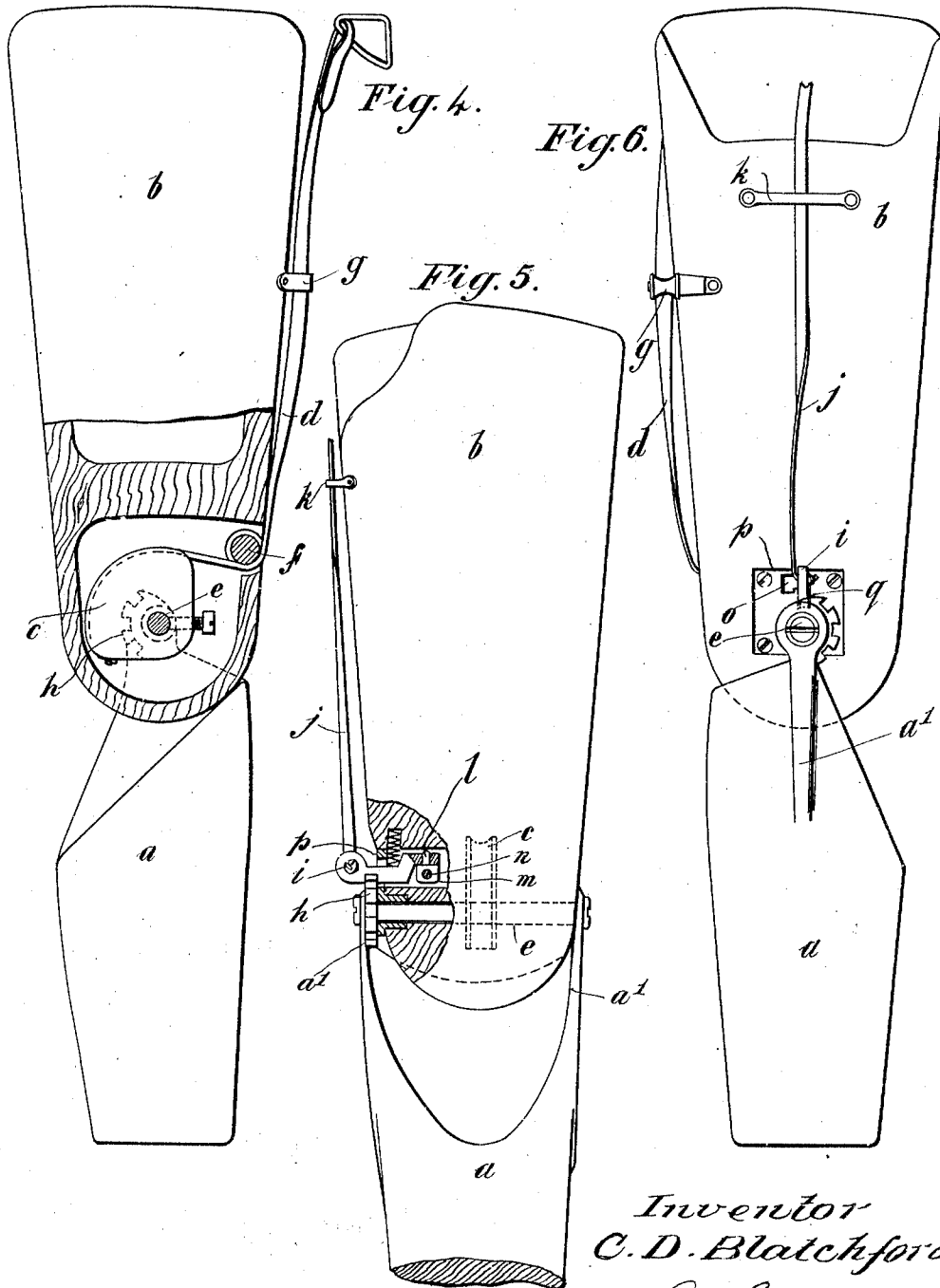
Patented Mar. 23, 1920.
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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ARTIFICIAL LIMB.

1,334,834.

Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed January 21, 1918. Serial No. 213,046.

To all whom it may concern:

Be it known that I, CHARLES DUNCAN BLATCHFORD, a subject of His Majesty the King of England, and resident of London, Kingdom of England, have invented certain new and useful Improvements in or Relating to Artificial Limbs, of which the following is a specification.

This invention relates to improvements in the construction of the joints and locking means of artificial limbs.

Heretofore it has been proposed to cause the forearm of an artificial arm to turn about the elbow pivot by tightening or drawing up a cord or strap which is attached at one end to the shoulder or body of the wearer and at its other end to the said forearm, the said cord being guided over suitable pulleys or curved surfaces provided at the joint.

Now according to the chief features of the present invention the lower end of the cord or strap is attached to a sector, drum or disk which is secured to the forearm or lower limb member or to the elbow or other pivot pin carried thereby, so that when the strap is pulled the sector, drum, or disk and the forearm will move together. Further I preferably provide spring controlled locking means at the joint whereby the parts may be positively locked against movement in both directions.

The invention is especially applicable for artificial arms for use where amputation has been effected above, through, below the elbow, or through the wrist, or legs where amputation has been effected above, below, or through the knee or through the ankle, for excision at the hip, or for shoulder amputation.

The invention is illustrated in and hereinafter described with reference to the accompanying drawings in which:—

Figure 1 is a side elevation of an adjustable artificial arm intended for use where amputation of the original limb has been effected at the upper or middle third of the forearm;

Fig. 2 is a similar view showing the forearm raised;

Fig. 3 is a front elevation of said arm corresponding in position to Fig. 1;

Fig. 4 is a sectional side elevation of an adjustable artificial arm intended for use where amputation of the original limb has been effected at the shoulder or at the lower, middle or upper third of the upper arm;

Fig. 5 is a sectional front elevation of said arm; and

Fig. 6 is a reverse side elevation.

As shown in Figs. 1, 2 and 3, and at the pivot or joint of the forearm and upper arm *a*, *b* respectively, a sector *c* is provided as an integral part of the portion *a* it is desired to move. The sector *c* may be replaced by a drum or a disk. To this sector *c* one end of a chain *d*, stranded wire cable, or the like *d* is suitably secured on the front or inside of the joint which, in the construction shown, is formed by a pair of pivot pins or studs *e* which unite the pairs of side straps *a'*, *b'* of the parts *a*, *b* respectively. This wire or the like *d* is connected to a cord or strap *d'* and passes away from the sector *c*, drum or disk around the back of suitable guide pulleys *f*, *g* and up to the back or other convenient part of the shoulder or the body to which it is secured in the known way by straps or in any other preferred manner. Thus the upward or forward movement of the upper arm or the stump thereof, where only a small portion remains, will cause the chain *d* and strap *d'* to be pulled and will, by reason of the before described joint connection or sector *c*, cause the forearm *a* to be simultaneously moved up or forward, and vice versa when the upper arm or stump is lowered or moved back.

In the case of an artificial leg the joint would be arranged so as to produce the forward movement of the lower leg, but for shoulder amputations the strap would be connected across the wearer's back to the opposite shoulder so that the movement of one shoulder would serve to control the arm.

The sector *c*, drum or disk may be arranged centrally within the joint where possible, as shown in Figs. 4, 5 and 6, instead of at the side according to the previously described construction of the limb. In this latter arrangement the sector *c* is secured to a transverse pivot pin *e* which passes through the lower solid portion of the up-

per arm *b* to engage the lower pair of side straps *a'* as shown.

I may also provide at the joint or pivot of the elbow a clutch or locking means which can either be adapted to normally maintain a rigid joint or to be normally free. Preferably the pivot pin *e* at the joint is as shown provided with a notched quadrant *h* adapted to be engaged by a spring-pressed pawl *i* when it is required to maintain a rigid joint. For the purpose of withdrawing the pawl *i* suitable transmission mechanism, such as a strap *j*, wire or other flexible member, is attached thereto and, after passing up the arm under a suitable guide member *k* is connected to suitable adjustable strapping on the body of the wearer. Thus, if the parts are properly adjusted expansion of the chest or movement of the wearer's shoulder will cause the spring-pressed pawl *i* to be withdrawn from engagement with the notched quadrant *h* and the joint to be freed and relaxation of the tension on the strap or intermediate member *j* will effect the locking of the joint in its adjusted position.

By this means it is possible to control the elbow lock without necessitating the use of the user's other hand to manipulate the joint as at present where locking joints are provided, although the present invention does not preclude the use of hand operated means for withdrawing the pawl in addition to the means before described. In the construction shown the pawl *i* is mounted to turn about a pivot *l*, Fig. 5, on a block *m* which in its turn is mounted to turn about another pivot *n* at right angles to the first pivot. By this means the pawl *i* can be raised and moved laterally when desired into a side slot *o* formed in the fixing plate *p* parallel with the main guide slot *q* in which the said pawl normally moves, thus permitting the locking mechanism to be used or put out of action at will. Preferably the improved stop or locking means are used in conjunction with the limb actuating means of the kind previously described, in which case the limb can be adjusted and locked in any set position with the utmost facility while leaving the other limbs of the wearer quite free.

It should be understood that no broad claim is made to the use of spring retained locking means except in connection with the improved joint mechanism of the kind above described, and which locking means is designed to positively lock the parts against movement in both directions.

What I claim is:—

1. An artificial limb comprising a lower limb member pivoted to an upper limb member, a sector connected to the lower limb member, an appendage having one of its ends connected to said sector and its other end to the body of the wearer and by means

of which the relative movements of the limb members are mechanically controlled, a notched quadrant adapted to move with the lower limb member, and a spring pressed locking device which coöperates with said notched quadrant to prevent movement of said lower limb member in both directions.

2. An artificial limb comprising a lower limb member pivoted to an upper limb member, a sector connected to the lower limb member, an appendage having one of its ends connected to said sector and its other end to the body of the wearer, a notched quadrant adapted to move with the lower limb member, a spring pressed pawl which coöperates with said notched quadrant, and means whereby said pawl can be rendered inoperative.

3. An artificial limb comprising a lower limb member pivoted to an upper limb member, a sector connected to the lower limb member, an appendage having one of its ends connected to said sector and its other end to the body of the wearer, a notched quadrant adapted to move with the lower limb member, a doubly pivoted spring-pressed pawl which coöperates with said notched quadrant, and a plate formed with a side slot into which said pawl can be moved laterally to render it inoperative.

4. An artificial limb jointed to bend in one direction only and comprising a lower limb member pivotally connected to an upper limb member, a single winding drum sector carried by the lower limb member and disposed in the bend of the limb so as to be concentric to the pivot of the joint, a guide pulley carried by the upper limb member, and an appendage connected to the winding drum sector at its one end and at its other end adapted to be connected to the body of the wearer, the whole arrangement and connection of the aforesaid parts being essentially such that the appendage is wound on the said drum when the limb is extended and unwound when the limb is bent thus enabling the said limb to be positively raised or moved against gravity when the said appendage is pulled.

5. An artificial limb jointed to bend in one direction only and comprising a lower limb member pivotally connected to an upper limb member, a single winding drum sector carried by the lower limb member and disposed in the bend of the limb so as to be concentric to the pivot of the joint, a guide pulley, carried by the upper limb member, an appendage connected to the winding drum sector at its one end and at its other end adapted to be connected to the body of the wearer, the whole arrangement and connection of the aforesaid parts being essentially such that the appendage is wound on the said drum when the limb is extended and unwound when the limb is bent thus

enabling the said limb to be positively
raised or moved against gravity when the
said appendage is pulled, a notched quad-
rant adapted to move with the lower limb
5 member, a spring pressed pawl or arm co-
operating with the said notched quadrant to
adjustably lock the limb against movement

in both directions and means whereby the
said pawl can be rendered inoperative at
will.

In testimony whereof I have hereunto
signed my name.

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CHARLES DUNCAN BLATCHFORD.