

Specification of Alfred Vincent Newton : artificial legs.

Contributors

Newton, A. V. 1820-1900.

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A.D. 1867, 9th JANUARY. N° 63.

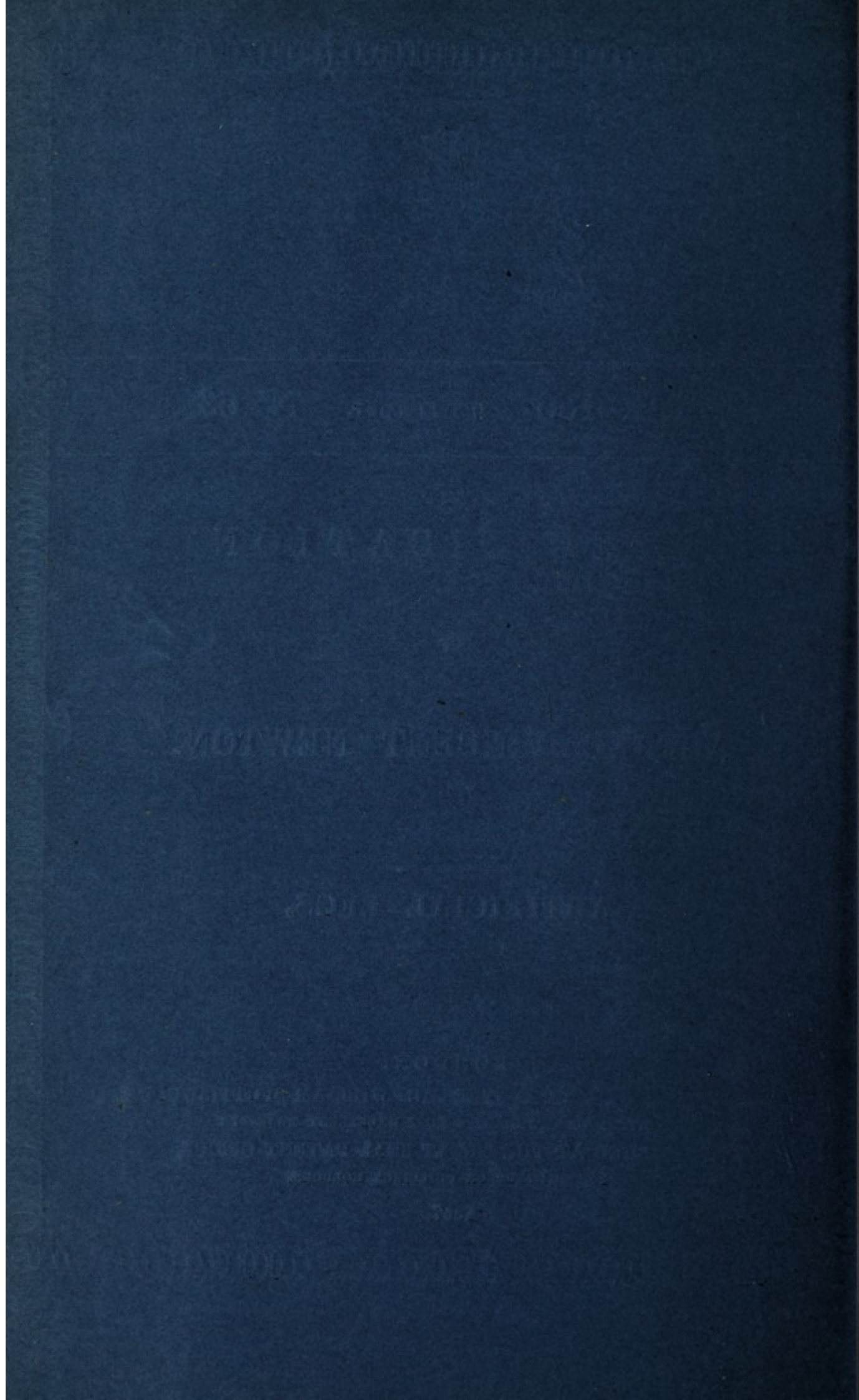
SPECIFICATION
OF
ALFRED VINCENT NEWTON.

ARTIFICIAL LEGS.

LONDON:
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A.D. 1867, 9th JANUARY. N° 63.

Artificial Legs.

LETTERS PATENT to Alfred Vincent Newton, of the Office for Patents, 66, Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, for the Invention of "**IMPROVEMENTS IN ARTIFICIAL LEGS.**"—A communication from abroad by Alexander Tough Watson, of the City and State of New York, United States of America.

Sealed the 19th March 1867, and dated the 9th January 1867.

PROVISIONAL SPECIFICATION left by the said Alfred Vincent Newton at the Office of the Commissioners of Patents, with his Petition, on the 9th January 1867.

I, ALFRED VINCENT NEWTON, of the Office for Patents, 66, Chancery Lane, 5 in the County of Middlesex, Mechanical Draughtsman, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN ARTIFICIAL LEGS,**" to be as follows:—

The object of this Invention is to produce an artificial leg approximating to the skeleton of the human leg, but capable of being lengthened or shortened 10 and expanded or contracted in the direction of the circumference at pleasure so as to suit any ordinary sized person, and which may be applied to any amputation of the thigh, leg, or foot, and may be used for right or left as required.

The artificial foot is made by preference of wood, in the form of a last cut 15 in two in a longitudinal vertical plane, and hollowed out to receive the

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attaching mechanism. The toe part is made separate and connected by a hinge joint so that it may yield in walking. The foot is connected with a curved leg piece by a fulcrum bolt, which passes horizontally through the foot to which it is firmly secured, and through a metallic segment to which the leg piece is clamped. The lower part of the periphery of the segment is fitted to turn 5 in a socket formed in the inside of the foot, so that the fulcrum bolt need not sustain the whole weight. The hole in this metal segment is slightly enlarged towards each end to enable the fulcrum bolt to vibrate in it laterally that the foot may turn slightly. A spring which extends from the heel to the toe is secured to the upper part of the segment by the clamping screw that connects 10 the segment and leg piece together. When therefore the foot in walking is thrown forward and the heel first strikes the ground the spring will permit it to yield upward, and as the foot falls back by the forward motion of the body the front part of the spring will yield and allow the front part of the foot to yield upwards, and finally the toe piece will yield upwards, thus causing the 15 foot to yield and return to the original position as the natural foot does in walking. To give greater power of resistance to the heel the spring may be doubled at the rear end. The leg is formed in two parts and of a tubular form fitted to slide the one within the other, like the tubes of a telescope; in this way the requisite strength with very little weight is obtained. The 20 lower end of the lower tubular part is fitted to slide on the leg piece, which connects with the foot, as before described, and a coiled spring is inserted in the tube and above the leg piece to yield slightly when the foot is brought to the ground, and thus to avoid any disagreeable concussion on the stump of the limb. There is a right and left screw within the tubular leg pieces, and parts 25 of each tube piece are threaded to fit the threads of the screw. At about the middle of its length the screw shaft carries a square to enable it to be turned to increase or shorten the length of the leg. Binding nuts are fitted to both ends of the screw to hold the parts firmly together when the required length has been obtained. The tubes are slotted to give access to the screw and to 30 the binding nuts so as to admit of turning them. The top of the upper tube is solid and bifurcated, the two branches forming about a semicircle, and their upper ends form bearings for an axle which constitutes the knee joint; keyed to the middle of this axle is an arm which extends down and is attached to or makes part of a segment, the upper ends of which are secured to a hoop 35 through the diameter of which the axle extends, and to which it is secured so that this hoop is between the two branches of the upper part of the leg. The segment bears upon a friction roller mounted on the upper end of the bifurcated tube. The segment is formed with a shoulder on each side and a

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little forward of the middle to act as stops to the upper part of the leg to prevent it from moving forward of a vertical or nearly vertical line when the person is standing up. In this way the leg can move on the axle as a knee joint to the extent of about a quarter of a circle, and two springs attached to
5 the axle and to the upper part of the leg serve to bring back the leg in line with the thigh whenever it is liberated. The lower ends of four metal straps secured to the hoop form or embrace the thigh; these straps are each made of two parts lapped and slotted longitudinally to receive flat headed screw bolts, by which the two parts are held together, but by means of which the
10 length can be increased or decreased to suit the length of thighs to which they are to be applied. And there are three other flat hoops secured to these straps by flat headed screw bolts; these hoops are formed with lap joints slotted and secured by flat headed bolts, so that their circumference can be varied to suit the person to which an artificial leg is to be applied, felt or
15 other suitable material being interposed between to form a socket to receive and protect the stump.

To suit an amputation of the leg below the knee the mechanism above described to form the knee joint is not required, and hoops are required to be applied to the stump of the leg and connected with four longitudinal straps,
20 like the thigh straps, but the lower ends of these straps are to be curved in under the stump and secured by suitable rivets to the top of the upper tube of the leg, which in such case is shortened.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed
by the said Alfred Vincent Newton in the Great Seal Patent Office on
25 the 9th July 1867.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, ALFRED VINCENT NEWTON, of the Office for Patents, 66, Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters
30 Patent, bearing date the Ninth day of January, in the year of our Lord One thousand eight hundred and sixty-seven, in the thirtieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Alfred Vincent Newton, Her special licence that I, the said Alfred Vincent Newton, my executors, administrators, and assigns, or such others as
35 I, the said Alfred Vincent Newton, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all

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times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN ARTIFICIAL LEGS,**" being a communication to me from abroad, upon the condition (amongst others) that I, the said Alfred Vincent Newton, 5 my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said 10 Letters Patent.

NOW KNOW YE, that I, the said Alfred Vincent Newton, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawings hereunto annexed, 15 and to the letters and figures marked thereon (that is to say):—

The object of this Invention is to produce an artificial leg approximating to the skeleton of the human leg, but capable of being lengthened or shortened, and expanded or contracted in the direction of the circumference, at pleasure, so as to suit any ordinary sized person, and which may be applied to any amputation 20 of the thigh, leg, or foot, and may be used for right or left, as required.

In the accompanying Drawings, Fig. 1 represents the artificial leg, partly in section, and suitable for an amputation at or above the knee; Fig. 2 is a front view of the knee joint and leg tube detached; Fig. 3 is a view of the artificial leg, partly in section, as adapted to an amputation below the knee; 25 and Fig. 4 is a partial front view of the same. The same letters indicate like parts in all the Figures.

a represents the artificial foot, which is made, by preference, of wood in the form of a last cut in two in a longitudinal vertical plane, and hollowed out to receive the attaching mechanism, care being taken to leave sufficient thickness 30 of wood for ensuring the required strength. The toe part *b* is made separate and connected by a hinge joint *c*, so that the toe end *b* may yield in walking, whilst at the same time a spring, to be presently described, tends to carry it back to a natural position. The foot formed, as above described, or in any analogous manner, is connected with the leg piece *g*¹ by a fulcrum bolt *d*, 35 which passes horizontally through the foot to which it is firmly secured, and through a metallic segment *e*, the lower part of the periphery of which is fitted to turn in a socket formed in the inside of the foot, so that the fulcrum bolt need not sustain the whole weight. The hole in this metal segment *e* is

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slightly enlarged towards each end to enable the fulcrum bolt to vibrate in it laterally that the foot may turn slightly. A spring *f* is fitted and secured to the upper part of the segment *e*, and the front end of it curves down to rest on the bottom of the inside of the foot and extends into the cavity of the

5 hinged toe piece *b*, and the rear end of the said spring curves down into the cavity of the heel and rests on the bottom thereof, so that when the foot in walking is thrown forward and the heel first strikes the ground the spring will permit it to yield upward, and as the foot falls back by the forward motion of the body the front part of the spring will yield and

10 allow the front part of the foot to yield upwards, and finally the toe piece will yield upwards, thus causing the foot to yield and return to the original position as the natural foot does in walking. To give greater power of resistance to the heel it is preferred to make the spring *f* double at the rear end, as represented, the upper leaf being at some distance above the lower

15 leaf, so as to be brought into action in case considerable pressure is made on the heel. The parts of the foot on which the spring bears are lined with leather or other substance more yielding than wood. The leg is formed in two parts *g* and *h*, and of a tubular form fitted to slide the one within the other, like the tubes of a telescope; in this way the requisite strength with very

20 little weight is obtained. The lower end of the lower tubular part *g* is fitted to slide on the leg piece *g*¹, which connects with the foot, as before described, and a coiled spring *a*¹ is inserted in the tube and above the leg piece *g*¹ to yield slightly when the foot is brought to the ground, and thus to avoid any disagreeable concussion on the stump of the amputated limb. The lower end

25 of the leg piece *g*¹ is so formed, as represented, that it can be firmly secured to the upper part of the segment *e* by a screw *i*, which at the same time secures the spring *f* which is interposed, as represented, between the lower end of the leg and the segment *e*. There is a right and left handed screw *j* within the tubular leg pieces, and parts of each tube piece are threaded to fit the

30 threads of the screw; at about the middle of its length the screw shaft is suitably formed as at *k*, so that it can be turned to increase or shorten the length of the leg. Binding nuts are fitted to both ends of the screw to hold the parts firmly together when the required length has been obtained. The tubes *g* and *h* are slotted to give access to the screw and to the binding nuts

35 so as to admit of turning them; other and equivalent means may be substituted for adjusting the length, and for holding the parts firmly when set, and to prevent the one part from turning on the other. The upper end of the tube *h* is solid and bifurcated, the two branches *l*, *l*, forming about a semi-circle, and their upper ends are fitted to turn on the ends of an axle *m*, which

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forms the knee joint; from the middle of this axle *m* an arm *n*¹ extends down, and its extreme end is attached to or makes part of a segment *n*, the upper ends of which are secured to a hoop *o*, through the diameter of which the axle *m* extends, and to which it is secured, so that this hoop is between the two branches *l*, *l*, of the upper part of the leg. The upper end of the tube *h* 5 is slotted, and within this slot is mounted a friction roller *p*, which rolls against the periphery of the segment *n*, the extent of which below the hoop *o* is a semicircle; this segment is formed with a shoulder *q* on each side, and a little forward of the middle to act as stops to the upper part of the leg to prevent it from moving forward of a vertical or nearly vertical line when the person 10 is standing up; in this way the leg can move on the axle *m*, as a knee joint, to the extent of about a quarter of a circle, and there are two springs *r*, *r*, attached to the axle *m*, and to the upper part *h* of the leg, the tension of which will bring back the leg in line with the thigh whenever it is liberated, either when walking or when rising from a seat. The lower ends of four metal straps 15 *s*, *s*, *s*, *s*, are secured to the hoop *o*, and each of these straps is made of two parts lapped and slotted longitudinally to receive flat-headed screw bolts *t*, by which the two parts are held together, but by means of which the length can be increased or decreased to suit the length of thighs to which they are to be applied. There are three other flat hoops *u*, *u*, *u*, secured to the straps *s* by 20 means of flat-headed screw bolts *v*¹, and the said hoops are formed with lap joints slotted and secured by flat-headed bolts *v*, so that their circumference can be varied to suit the person to which an artificial leg is to be applied, felt or other suitable material being interposed between to form a socket to receive and protect the stump. 25

The modification of the Invention to suit an amputation of the leg below the knee is represented in Figures 3 and 4 of the accompanying Drawings; in this modification the mechanism, above described, to form the knee joint is not required, and hoops, such as *u*, *u*, in Fig. 1, are required to be applied to the stump of the leg, and connected with four longitudinal straps like the 30 thigh straps *s*, *s*, in Fig. 1; but the lower ends of these straps are to be curved in under the stump, and secured by suitable rivets, as at *y*, to the upper end of the tube *h* of the leg, which in such case is shorter than in Fig. 1; the two parts *g* and *h* of the leg are, however, to be connected and made adjustable in the same manner as in Fig. 1, except that the parts are to be made shorter. 35 The front and back longitudinal straps *s*, *s*, do not extend above the hoop *u* next below the knee, but the two side ones extend up to the knee joint, and are there to be connected by rule joints, as at *w*, to the side thigh straps *x*; the thigh straps are to be secured to the thigh by adjustable hoops, as in Fig. 1.

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It will be obvious from the foregoing that some of the improvements may be used without others by substituting other means, and therefore I do not wish to be understood as limiting by claim of Invention to the use of all the said improvements in connection.

- 5 Having now set forth the nature of the Invention of "Improvements in Artificial Legs," as communicated to me from abroad, and explained the manner of carrying the same into effect, I wish it to be understood that under the above in part recited Letters Patent I claim, the connection of the foot with the leg by means of the joint, substantially as described, in combination
10 with the spring extended both ways for action at the heel and at the toes, substantially as and for the purpose described.

I also claim the toe piece hinged to the front part of the foot, substantially as described, in combination with the spring which controls the movements, substantially as described.

- 15 I also claim the leg made in two parts and adjustable in length, substantially as described.

I also claim making the leg of two tubes fitted to slide the one within the other in combination with the means or the equivalent thereof for adjusting the length of the leg.

- 20 I also claim the adjustment longitudinal straps, and the adjustable hoops in combination, substantially as described, as a means of fastening the artificial leg to the thigh or to the stump of the leg, as described.

I also claim the knee joint, substantially as described, in combination with the leg and foot, or their equivalents.

- 25 In witness whereof, I, the said Alfred Vincent Newton, have hereunto set my hand and seal, the Ninth day of July, in the year of our Lord One thousand eight hundred and sixty-seven.

A. V. NEWTON. (L.S.)

Witness,

- 30 J. W. MOFFATT,
66, Chancery Lane.

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1867.

It will be obvious from the foregoing that some of the improvements may be used without others by substituting other means, and therefore I do not wish to be understood as limiting by claim of invention to the use of all the said improvements in combination.

I have now set forth the nature of the invention of "Artificial Legs", as communicated to me from abroad, and explained the manner of carrying the same into effect. I wish it to be understood that under the above in part recited letters patent I claim, the connection of the foot with the leg by means of the joint, substantially as described, in combination with the spring extended both ways for action at the heel and at the toes, substantially as and for the purpose described.

I also claim the toe piece hinged to the front part of the foot, substantially as described, in combination with the spring which controls the movement, substantially as described.

I also claim the leg made in two parts and adjustable in length, substantially as described.

I also claim making the leg of two tubes fitted to slide the one within the other in combination with the means or the equivalent thereof for adjusting the length of the leg.

I also claim the adjustment longitudinal straps, and the adjustable hoops in combination, substantially as described, as a means of fastening the artificial leg to the thigh or to the stump of the leg, as described.

I also claim the knee joint, substantially as described, in combination with the leg and foot, or their equivalents.

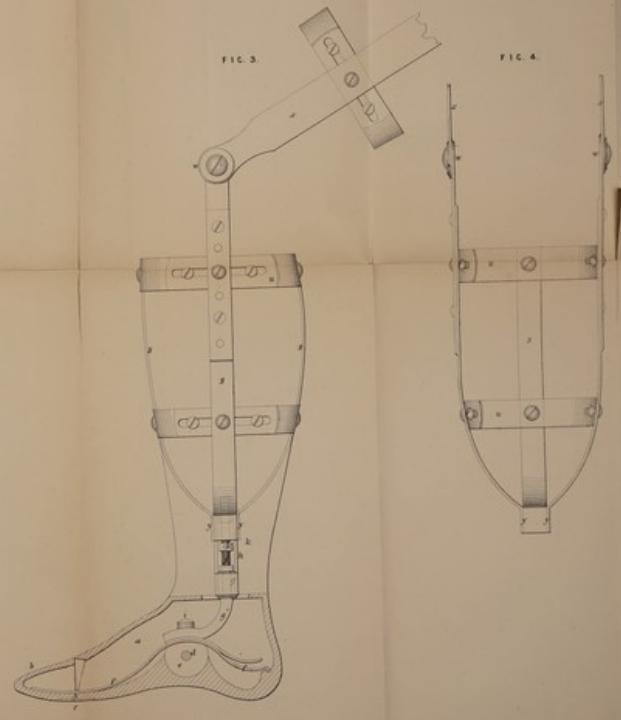
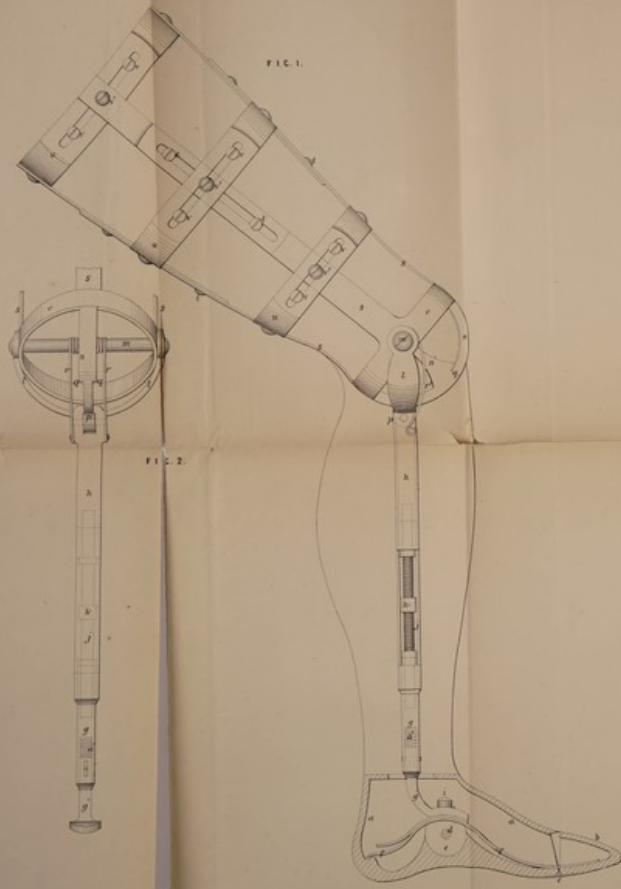
In witness whereof, I, the said Alfred Vincent Newton, have hereunto set my hand and seal, the Ninth day of July, in the year of our Lord One thousand eight hundred and eighty-seven.

ALFRED VINCENT NEWTON, (A.S.)

Witness my hand and seal, this Ninth day of July, 1887.
J. W. MORTON, Clerk of the Court.
66, Chancery Lane.

LONDON:

Printed by GEORGE EDWARDS and WILLIAM STODOLSKY, 15, Abchurch Lane, E.C. 4.



The first drawing is partly colored.

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