Improvements in artificial limbs / [Amos Lincoln Woodland].

Contributors

Woodland, Amos Lincoln.
Rainsford, R.

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Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

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PROVISIONAL SPECIFICATION.

Improvements in Artificial Limbs.

I, AMOS LINCOLN WOODLAND, of Midland, County of El Paso, State of Colorado, United States of America, Professional Cook, do hereby declare the nature of this invention to be as follows:—

The object of this invention is to provide artificial limbs with joints which will work freely but with sufficient friction to move more naturally and with a motion similar to that of the natural limb. Other advantages pertaining to the invention will suggest themselves to those persons wearing the limbs.

I will describe my invention as applied to a leg and foot, but it will be obvious that the same mechanism is equally applicable to arms.

The upper or thigh portion of the leg is rounded to fit and work in the socket formed by the peculiar shape of the upper edge of the hollow lower or calf portion. A horizontal bolt, preferably made of wood boiled or soaked in oil, extends across the hollow upper limb, just above the joint, and can move up and down in an oval shell or sleeve having a screw-threaded shank screwed into an aperture in the lower rounded part of the upper limb and by means of which it is held in position. A spring or springs may be inserted between the shell and wooden bolt to create the necessary close contact of the two parts of the limbs. A set-screw, passing through the screw-threaded shank and bearing against the shank of a half circular hoop which partly encircles and supports the wooden bolt, serves to regulate the friction caused by the spring. A metal rod, passed longitudinally through the wooden bolt, extends outwards beyond the outer opposite surfaces of the upper part of the limb, and has straps projecting up from and secured to the lower limb, buttoned over its ends and secured thereon by a nut or the like.

Similar mechanism is fitted in the lower part of the limb; but in this case the oval casing projects out of the lower part of the limb beneath and at the back of the lowest part of the upper portion of the limb and is secured thereto, in that position, by straps depending downwardly from the upper portion of the limb, in the same manner as afore described. Moreover the shank of the half circular band upon which the wooden bolt rests projects downwardly into the lower portion of the limb and through a cross stay or web therein. Coiled springs are arranged upon the rod, are adjustable by a nut or nuts, and are compressed by the bending of the joint.

The foot of the limb,—if an artificial leg—is made of various pieces, comprising the instep-piece, sole, heel-piece, and toe-piece which are united by rubber or other springs in such manner that, when walking, the joints can bend and resume their normal position when the strain upon them is released, as when the foot is raised.

Dated this 18th day of March 1898.

R. RAINSFORD,
Agent for Applicant.

[*Price 8d.*]

COMPLETE SPECIFICATION.

Improvements in Artificial Limbs.

I, AMOS LINCOLN WOODLAND, of Midland, County of El Paso, State of Colorado, United States of America, Professional Cook, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

My invention relates to improvements in artificial legs, and feet, and the objects of my improvements are, first, to construct an artificial leg which will be light durable and easy to operate, noiseless, and require little or no oiling of joints; secondly to construct a foot which will perfectly adjust itself to the different positions required in natural walking and to make the foot light, durable, and without metal springs or unnatural sound when coming into contact with the floor or sidewalk when walking; thirdly to provide an adjusting apparatus for the compensation of wear and to prevent rattling in the joints and to so arrange this mechanism that the socket in the thigh piece will admit of as long a stump as possible without having to make the knee joint lower than it should be; fourthly, to make knee springs which can be adjusted to suit the ideas of the wearer. I attain these objects by means of the mechanism illustrated in the accompanying drawings which are made a part of this specification.

Figure 1 is an exterior side view of the leg and foot constructed in accordance with my invention.

Fig. 2 is an exterior side view of the foot and shews the foot as it appears when the body of the wearer and the top of the leg are moved forward with weight resting on toe and ball of foot.

Fig. 3 is a vertical, sectional, longitudinal side view of the centre of the leg and foot as they appear when the weight is taken off of the leg preparatory to taking an advancing step.

Fig. 4 is a similar view but sectional only about the knee shewing the position of the leg and foot, stop-rod and springs when they have been moved forward in making a step, the weight resting on the heel.

Fig. 5 is a similar view shewing the position of the leg, foot, stop-rod, and springs adjusted to a sitting position.

Fig. 6 is an exterior side elevation of the foot as it appears before the rubber springs and the leather straps have been placed in position and attached to the instep, also shewing the shape of the ankle where it joins on the shank.

Fig. 7 is an exterior side elevation of the foot complete ready to be secured to the shank.

Fig. 8 is a detail side view of the roller and frame for attaching the suspenders to the leg.

Fig. 9 is an enlarged exterior longitudinal view of the device forming the knee-joint and adjusting apparatus.

Fig. 10 is a sectional view of Fig. 9 taken through the points indicated by the line 1—2.

Fig. 11 is a sectional side view of the centre of the knee between the dotted lines 3 and 4, Fig. 1, with the parts in the same position as shewn in Fig. 3 and giving a view to the parts shewn in Fig. 10, and in addition thereto a sectional end view of the joint and adjusting apparatus for governing the action of the inferior part of the leg and a longitudinal exterior view of the stop-rod springs, bushings,

drum, washer, and nuts connected therewith, also a longitudinal sectional side elevation of the bridge.

Fig. 12 is a side view of the joint and adjusting apparatus for governing the action of the inferior part of the leg and a side view of the straps for supporting and attaching such joint to the thigh piece and a longitudinal vertical view of the stoprod with nuts attached, also a sectional view of the washer on such stop-rod and drum and shewing the position of the spring in the drum.

Fig. 12^1 is a longitudinal vertical edge view of one of the straps shewn in Fig. 12.

Fig. 12^2 is an end view of the nut to be used on the stop-rod.

Fig. 13 is a view of the top of the drum through which the stop-rod passes.

Fig. 14 is a longitudinal apex view of the bridge and cushion thereon.

Fig. 15 shews a part of the suspenders at the back for supporting the artificial leg and how the parts for supporting the pants or skirts are attached thereto.

Fig. 16 shews the same as Figure 15 in the front instead of at the back.

Figure 17 is a front view of the entire suspender used in supporting an artificial leg, also the shield for protecting and keeping the clothes in place.

Similar characters of reference indicate similar parts in all the views.

Fig. 1 shews the exterior side of a leg and foot constructed in accordance with my invention for a thigh amputation, in which A and B are outside shells for the upper and inferior parts of the leg, respectively, made of wood rubber, paper or other suitable material. C is a hollow piece of the same material forming the upper and instep part of the foot.

i and *n* are the heel and toe of the foot made of the same material as C.

The thigh piece A shank B, instep C toe-piece *n* and heel-piece *i*, if made of wood should be covered with raw hide.

a is a groove or notch cut in both sides of the shell A, and is deep enough to allow the free passage of the ends of the suspenders R, R (Fig. 17) between the metal plate *b* and a shorter metal plate b^1 at the bottom of the groove *a*.

b is the outside or long plate of the roller-frame (Fig. 8) and b^1 the inside or short plate. These plates are rivetted together above and below the roller *c* and far enough apart to admit the roller. Both plates have a hole in the centre to admit shaft *d* which passes through the long plate *b* and the roller *c* and is screwed in the plate b^1. The long plate *b* has holes for screws near either end for attaching the roller and frame to the leg.

A recess a^1 is cut vertically in the thigh shell A across the groove *a* large enough to receive the plate b^1 and the roller *c*, so that the outside of plate *b* will be even with the exterior surface of the shell A and the plate b^1 will be even with the bottom of the groove *a*. The roller *c* is made of wood and is boiled or soaked in oil, so that it requires no oiling when in use. The roller *c* revolves on the shaft *d*. The rollers *c c* secured as above described, in the grooves *a a*, on either side of the leg serve to adjust the suspenders, which pass under them, to the varying positions of the body.

The thigh shell A is connected to the inferior part of the leg by means of strong metal straps *e e* which are securely fastened, by means of screws, rivets or the like, or small bolts on each side of the upper exterior surface of the shell B. These straps have an eye in their upper section, through which passes the rod *f*, as can be more fully seen by reference to Fig. 9 and the parts marked *e e* and *f f*. The straps *e e* rest firmly against the ends of the wooden knee bolt *r* and are held there by the nut f^1 being screwed on the rod *f*. The purpose of having the straps *e e* brought in firm contact with the bolt *r*, is to force the knee-bolt *r* to turn in the metal shell *s*.

I is a hole cut through the shell B into the cavity P, so that a wrench can be introduced when it is necessary to adjust nuts N. In my invention of a combined leg and foot there is no ankle-joint; but as a substitute for such joint I make a highly flexible foot, which serves all the purposes of an ankle-joint without any complex mechanism. In Fig. 1 this foot is shewn as it appears when the wearer is standing upright. The weight is principally on the ball of the foot, thereby preventing

treacherous bending of the knee joint. The construction of the foot will be fully explained in connection with Figs. 6 and 7, and in the same connection Fig. 2 will be explained.

In Fig. 3 it will be seen that inside of the shells A and B there are cavities O and P. The upper part of the cavity O is made to neatly fit the sides of the stump, and the lower section of the cavity is made as large as is consistent with strength and durability in the shell B.

The knee joint is constructed by making a hole through the shell A at the knee from one side to the other large enough to receive the metal shell *s*. Also a hole is made to extend from the lower end of the cavity O through the shell A at the end of the knee, in which hole the shank *t* is firmly screwed from the cavity O. The shank *t* is hollow, and the upper section of the hole is smooth and somewhat larger than the lower end section. The large and smooth portion is for the reception of the short round shaft v^1. The small hole at the lower end of the shank *t* is threaded to receive a set screw *u* (Fig. 10). Attached to the upper end of the shank *t* is an oval collar t^1 large enough to encircle the knee bolt *r*, the metal shell *s*, and to allow these parts to be adjusted by a slight vertical movement. The sides of the collar t^1 are straight for a short distance on both sides of the centre to allow the semi-circular collar or bushing *v v* room to move up and down inside it. The semicircular collar *v* is secured to the upper end of the shaft v^1 and the wooden knee bolt *r* rests in the collar *v*, and any wear of the bolt is compensated by raising the collar *v* and knee bolt *r*, by means of the set screw *u*, until the bolt *r* comes in contact with the top of the metal shell *s*. There are lips v^2 at each side of the collar *v* which works in grooves t^2, cut in the side of the collar t^1 which helps to hold the collar *v* in position.

The adjusting device above described, consisting of the threaded shank *t*, oval collar t^1 short shaft v^1, semicircular piece *v*, and set-screw *u*, is fastened in the shell A at the lower extremity of the cavity O by having the shank *t* screwed from the lower end of the cavity O into the hole in the end of the shell A until the collars are in line with the holes in each side of the knee. The hollow metal cylindrical shell *s* is next inserted in the shell A at the side of the knee and passes through the oval collar t^1 and semicircular collar *v* and out at the opposite side of the knee. The shell is made of metal and is smooth and polished on its inner surface. The lower central longitudinal section of the shell is cut away in order to let the semicircular collar *v* come in contact with the wooden knee-bolt *r*, which passes through the shell as is more fully shewn in Fig. 9.

The shell *s* fits tight in the holes in the knee and cannot be turned by the action of any of the parts working in or on it and does not quite reach through the knee. The wooden knee-bolt *r* is next inserted in the shell *s* and through the collars t^1 and *v*. The bolt *r* is a little longer than the shell *s* and is made to project slightly beyond it at each end. This bolt is made of very hard wood and has a narrow metal band a little smaller than the bolt on each of its ends to prevent the bolt from being split. The bolt is polished and boiled or soaked in oil, and when in use it requires little or no lubrication. It also has a hole through the centre from end to end for the reception of the rod *f*. Next the shell B, with straps *e e* attached is put in position, so that there will be a strap at each end of the bolt *r*, and the eyes in the straps *e e* will be in line with the centre of bolt *r*. The rod *f* passes through the straps *e e* and bolt *r*, and the nut f^1 is screwed on the rod *f* and brings the straps *e e* firmly against the ends of the knee-bolt *r*. The hollow shell *s* and the semicircular collar *v* serve as a boxing for the knee bolt *r*, and in the event that the knee bolt wears so as to become loose or rattle it can be readily tightened by turning the set-screw *u*, and thereby raising the bolt *r* up against the shell *s*.

In Figs. 3, 4 and 5 the relative location of the different parts above described are shewn in the thigh, and in Figs. 9, 10 and 11 the same parts are shewn in detail in an enlarged view.

The inferior part of the leg is adjusted to meet the requirements of the different positions assumed in walking and sitting by means of the joint, stop-rod, nuts,

springs, bridge drum and washer (shewn in place in Figs. 3, 4, 5 and 11) and shewn in detail in Figs. 11, 12, 12^1 12^2, 13 and 14, in which W is a small metal shaft running through the centre of the wooden bolt q, such rod having a flat round head at one end and a thread cut on the other end to receive the threaded nut W^1. The rod W serves to support the bolt q and to prevent it from turning by drawing the straps w w and the leather washers q^1 q^1 up against the ends of such bolt.

The wooden bolt q is made of the same material and constructed in the same way as the knee-bolt r. The leather washers q^1 q^1 are to prevent the ends of the collars x and y from rubbing against the straps w.

The collars x and y and the short shaft y^2 (see Fig. 11) and the shank x^1 groove x^2 and the lips y^1 are similar in construction to the collars t^1 and v, the shaft v^1 and groove t^2 the lips v^2 and shank t with the exception that there are no threads on the outside of the shank x^1 as there are on the shank t, and in place of the set screw u we have the stop-rod z with threads on each end. The rod z is screwed into the shank x^1 until the upper end of the rod rests against the lower end of the shaft y^2. The rod z has a small hole z^1 in its upper section to receive the end of a wrench or implement for turning the rod and thereby raising or lowering the shaft y^2 and adjusting the collar y to the bolt q, thus providing a ready means of compensating any wear of such bolt and to prevent rattling. The nut D is screwed on the rod z before the rod is screwed in the shank x^1. Next below the nut D is placed a round coil steel spring E, bushed at several points, as shewn at E^1, (Fig. 11) to prevent noise, or in place of the steel spring E, a rubber tube of sufficient elasticity and density to serve the purpose of the spring can be substituted for the spring if desired. Next below the spring is placed the washer F, which has a hole through it large enough to permit the rod to have an extended lateral movement without changing the washer from a flat position on the bridge G.

The lower end of the rod is next passed through the hole in the bridge G, and the straps w w are firmly fastened by screws to the back part of the thigh piece, a portion of the shell A having been cut away to receive the pieces composing the joint, as shewn in Fig. 11. The short hollow cylindrical drum L has its lower end open in order that the spring M may slip readily into it, and its upper end is closed except where the rod z passes through it to serve as a rest for the spring M, as can be seen by referring to the parts marked L Figs. 12 and 13.

The spring M is similar in construction to the spring E, and is slipped over the lower end of the rod z up against the head of the drum L. The nuts N are then screwed on the lower end of the rod z up against the spring M until the leg will be straight when the spring M is compressed in the drum L and the nuts N come in contact with the drum L as shewn in Fig. 4. The drum L is lined on the inside with leather or rubber, which serves as a bushing to prevent the spring M from coming in contact with the metal and making a grating noise. The spring M is bushed with leather or rubber on its inner side similar to the spring E. The nuts N and D are turned or adjusted on the rod z by the end of a wrench inserted in the notches D^1 cut in the nuts N and D.

The nuts N have to be adjusted through the hole I in the shell B (see Fig. 1).

The bridge G (Fig. 14) is a long piece of hard wood of square section, having a rubber pad or cushion set in the top and bottom as shewn by H^1, H^2, Fig. 11, also a groove as indicated by H in the sectional side view Fig. 11, and is securely fastened in the shell B at each side of the cavity P near its middle section. The top of the bridge is shewn in Fig. 14 where the groove is indicated by the dotted lines H on each side of the hole for the stop-rod z, and H^1 is the top pad or cushion. In the sectional view Fig. 11 the shape of the groove is fully shewn as well as the construction of the bottom of the bridge. The purpose of the groove in the bridge is to allow the stop-rod z to move backward and forward across the leg. The lower edge of the bridge has a slanting face so adjusted that the head of the drum L will rest squarely against the slanting face of the bridge when it has the rubber cushion H^2 when the weight is on the leg as shewn in Fig. 4.

The operation of the parts just described as herein illustrated for the governing of the inferior part of the leg is as follows: When the weight of the body is on the artificial leg, as illustrated in Fig. 4, the rod *z* is drawn up through the bridge and the drum until the nuts N are brought into contact with the lower end of the drum L, and the upper end of the drum rests square against the rubber cushion at the bottom of the bridge G thereby compressing the spring M into the drum L. When the weight is taken off the leg, the spring M acting against the bridge G and the nuts N, bends the knee slightly forward, thereby raising the heel, so that the leg is in a position for taking a forward step, as illustrated in Fig. 3. There is very little tension on either spring at this point, and the collars *x* and *y* are turned slightly on the bolt *q*. As the leg is moved forward in taking an advancing step the knee naturally bends, and the collars *x* and *y* turn on the bolt *q*, and the bridge and nut D come toward each other, thereby compressing the spring E and relaxing the spring M. When the thigh is advanced far enough for a step, it is stopped by the stump of the wearer and the spring E, acting against the bridge G and the nut D. The forward movement of the leg compresses the spring M into the drum L until the nuts N come in contact with the end of the drum when the leg is stopped in a proper position for setting the foot down on the floor, as shewn in Fig. 4. In this action the spring M stops the sudden jar that otherwise would occur when the nuts N come in contact with the bottom of the drum L. Thus the springs E and M, stop-rod *z*, nuts N and D, collars *x* and *y*, shanks x^1 and y^2, bolts *q* and W, drum L and bridge G acting in connection with the straps *w w*, form a flexible and adjustable stop rod, for all movements of the inferior part of the leg, as shewn in Figs. 3, 4, 5 and 11.

When the leg is bent as it would be when the wearer was sitting down, the joint and adjusting apparatus at the upper end of the stop rod *z* is moved so that it is a little forward of the knee joint, thereby changing the direction of the rod *z*, so that the spring E acting between the nut D and the bridge G, holds the inferior part of the leg back, instead of moving it forward, and the lower end of the rod *z* is moved to the back part of the cavity P, and the spring M is relaxed as shewn in Fig. 5.

The collars *x* and *y* make nearly a half turn on the bolt *q* in changing from an upright to a sitting position. The action of the springs E and M can be changed by screwing the nut D down on the rod *z*, because the spring E is enough stronger than the spring M to compress it in the drum if the nut D is screwed down to give it pressure, thereby affording a spring which is always inclined to force the leg straight or forward except when in a sitting posture.

The foot is constructed of three pieces of wood, or other suitable material joined together by means of a sole *m* made of leather or any suitable material, which covers the entire bottom of the foot and is fastened to the bottom of the heel piece *i*, instep-piece C and toe-piece *n* by screws. The heel piece *i* and toepiece *n* are held in proper position by means of the leather straps *h* and *l*, which straps are securely fastened by screws or tacks one to the front and the other to the rear of the instep piece C after the rubber springs J and K have been inserted as shewn in Fig 7.

The instep piece has a concave groove cut across the bottom about midway between the ends and a similar groove, except smaller, across the front end about the centre vertically. The bottom of the front end of the piece C is cut away about half way back to the bottom or larger concave groove, so that the back or flat part of the rubber spring K can be inserted between the piece C and the sole *m*. When the foot is fastened together there are screws which pass through the sole *m*, the back part of the spring K and screw into the piece C. A small rubber teat *g* is attached to the straight surface on the underside of the piece C, near its centre to prevent the piece *i* from coming into violent contact with the piece *c* in case the spring J should get weak and also to give the heel a chance to adjust itself to uneven surfaces. The heel piece *i* is a thin piece of the same material as the piece C and is straight on its upper surface and round on the bottom and back end to make it correspond to the shape of a natural heel. The forward end is concave to fit the rubber spring J,

against which it rests. The toe piece *n* is shaped on the bottom, top and front end like the natural foot, and the back end of this piece has a concave groove cut across it horizontally about the centre, and above and below the groove this piece is bevelled. When the toe piece *n* and the piece C have been cut and the sole *m* fastened to them, as above described, the space *j* corresponds to the shape of the rubber spring K, which spring is inserted in the space between the pieces *n* and C and the toe-piece *n* is brought up in proper position and the strap *l* fastened to the instep C. The rubber spring J is next inserted in the holes made by the concave grooves across the bottom of the piece C and the end of the piece *i*. The heel piece *i* is next raised in position and the strap *h* fastened to the piece C.

I prefer applying the springs J and K in accordance with the weight of the wearer. A heavy person requires full springs, as shewn in the drawings, and a light person a lighter spring, and in order to adjust the foot to such a person the rubber spring K is cut off at the top so that it fills the space *j* only to the top of the grooves in the toe piece *n* and piece C. The end of the spring J is also cut off making the spring lighter and more easily compressed. In all cases the rubber springs J and K must be large enough to hold the toe and heel down in place and allow them to move upward only when considerable pressure rests upon them. The back part of the rubber K serves as a cushion for the ball of the foot.

If the foot be made of wood, the grain should run lengthwise of the foot and the top of the piece C cut as shewn in Fig. 6, and the lower end of the shank B be made to correspond. In connecting the foot to the leg, the toe and the front end of the piece C should made enough lower to allow for the heel on the shoe of the wearer.

In operation the foot appears as shewn in Fig. 1 when the wearer stands erect, and as the top of the leg is moved forward the heel rises from the floor and the weight falls upon the toe and the rubber spring K gives and allows the toe piece *n* to close up toward the instep C as shewn in Fig. 2. When the weight is taken off the foot preparatory to taking an advancing step the foot assumes the position shewn in Fig. 3. As the foot is advanced a step the heel first comes in contact with the floor compressing the heel piece *i* against the teat *g* as shewn in Fig. 4, and as the leg is moved forward to an upright position the heel piece *i* springs down and assumes the position shown in Fig 1.

The flexibility given the foot by the operation of the pieces *i* and *n* and the rubber springs J and K enables the wearer to walk easily and naturally.

In Fig. 15 R R shew the construction of the suspenders which support the leg and R^1 R^1 are buttons sewn or riveted to the suspenders and to these the upper ends of the pants or skirt supporters are buttoned. The pants or skirt supporters are constructed of two pieces of elastic web S^2 S^2, which have a leather button hole in their upper ends for the reception of the buttons R^1 R^1. These webs are joined together at the lower end similar to the ordinary suspender, and to them are connected webs or straps, as ordinarily used in supporting the pants at the back. One of the elastic webs S^2 is made shorter than the other so that their lower ends will meet in the centre of the back and not at one side, as they would if both were the same length. The suspenders R R extend down in the grooves *a a* and around the rollers *c c* as shewn in Fig. 17. The back and front of the suspenders are alike in general construction.

In Fig. 16 the construction of the front of the suspenders R R is shewn together with the front supports R^3 R^3 for the pants or skirts and the buttons R^2 R^2 by such supports are attached to the suspenders R R.

The pants or skirts supporters R^3 R^3 are made like an ordinary suspender, except that they have a leather button-hole at the upper end to receive the buttons R^2 R^2. The pants or skirts supporters are attached to the suspenders R R in order to keep the latter in place and to make one pair of suspenders answer all purposes as near as possible.

The suspenders R R are crossed and riveted together at their juncture both behind

and front, at the point S^1 above where they pass around the wooden rollers *c c* in the grooves *a a*.

The suspenders are crossed and fastened together in order that the leg may be kept in proper position when the body is moved from side to side or one shoulder is lowered more than the other. If they were not so crossed and fastened together the lowering of one shoulder more than the other would let the leg swing in or out according to which of the shoulders was lowered, and this would be true whether the suspenders were crossed or not, but the suspenders being riveted together the leg is held in position as long as either one of the suspenders is kept tight. The parts of the suspenders which pass over the back go down through the grooves *a a*, around the rollers *c c* and come up to the buckles V V, where they are fastened by means of these to the parts of the suspenders coming down in front of the body. The buckles V V serve to tighten or loosen the suspenders, as may be required from time to time, to keep the leg at the proper height or to detach the suspenders from the leg. In detaching the leg and suspenders from the wearer it is not necessary to unbuckle any of the buckles, because the suspenders are easily slipped over the head of the wearer after the skirts or pants have been loosened from the suspenders and unbuttoned preparatory to undressing. The parts of the suspenders R R from the buckles V V up the front, over the shoulders and down the back to a corresponding point behind are made of leather, English web, elastic web, or any suitable material, but the remaining part of the suspenders is made of leather which may be either flat or round. If round there should be grooves in the rollers *c c* to receive them.

The suspenders R R both before and behind pass down over leather shields, made as shewn by T, Fig. 17, the lower ends of such shields being attached to the shell A by means of a screw having play enough in the hole through the shield to allow the shield to move laterally as required. A leather strap U riveted or sewn at each end near the top of the shield T serves to keep the shield in place when the suspenders have been passed through between the strap U and the shield T. The shield T serves to protect the clothing from the wear of the suspenders passing over them, and also serves to keep the clothing from working up and getting in bunches and rolls from the action of the suspenders against them.

Having now particularly 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 is :—

(1) In an artificial leg and foot, the combination of the thigh shell A having the metal shell *s* secured in the knee and a hole through the end from the bottom of the cavity O with the oval collar t^1 encircling the shell *s*, and attached to the hollow threaded shank *t*, such shank having in its upper inner section the short rounded shaft v^1 attached to the semi-circular collar *v*, and in its lower inner threaded section the set screw *u* substantially as described.

(2) The combination in an artificial leg and foot, of the hollow wooden knee bolt *r* which has been soaked or boiled in oil, and having metal bands on each end and working in the metal shell *s* and semicircular collar *v*, with the shank B having the straps *e e* secured to the shank B said straps having eyes in their upper section for the reception of the rod *f* which passes through said straps and through the wooden bolt *r* and secured by the nut f^1 being screwed on the rod *f* all substantially as set forth.

(3) The combination in an artificial leg and foot, of the straps *w w* secured to the back part of the thigh-shell A with the hollow wooden bolt *q*, having short shaft W passing through it, and the leather washers q^1 and straps *w w* secured by the nut W^1 being screwed on said shaft W, substantially as described.

(4) The combination in an artificial leg and foot, of the oval collar *x* with the hollow shaft x^1, round shaft y^2, collar *y*, stop rod *z*, nut D, springs E and M, bushings E^1 E^1, washer F, drum L, nuts N, bridge G, rubber cushions H^1 and H^2, substantially as described, and for the purposes set forth.

(5) The combination in an artificial leg and foot, of the shell B with the instep piece C, teat *g* sole *m*, heel-piece *i*, toe-piece *n*, rubber springs J and K substantially as described and for the purpose set forth.

Dated this 19th day of December 1898.

R. RAINSFORD,
Agent for Applicant.

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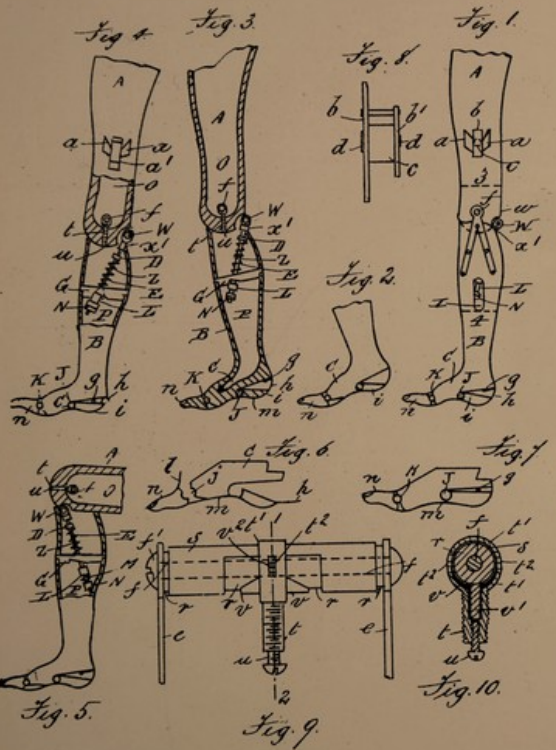
A.D. 1898. March 19. N° 6666.

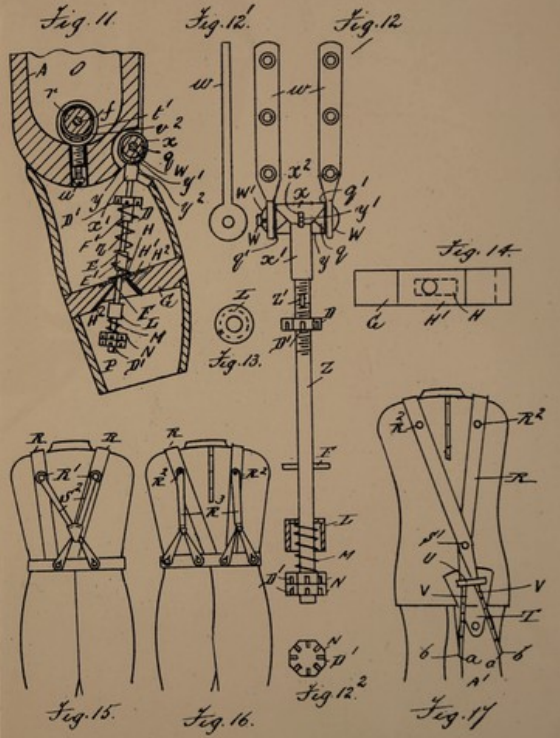
WOODLAND'S Complete Specification.

(2 SHEETS)

SHEET 1.



SHEET 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

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