

## **Specification of James Ashman : artificial limbs.**

### **Contributors**

Ashman, James.

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A.D. 1856 . . . . . N° 1754.

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S P E C I F I C A T I O N

OF

JAMES ASHMAN.

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ARTIFICIAL LIMBS.  
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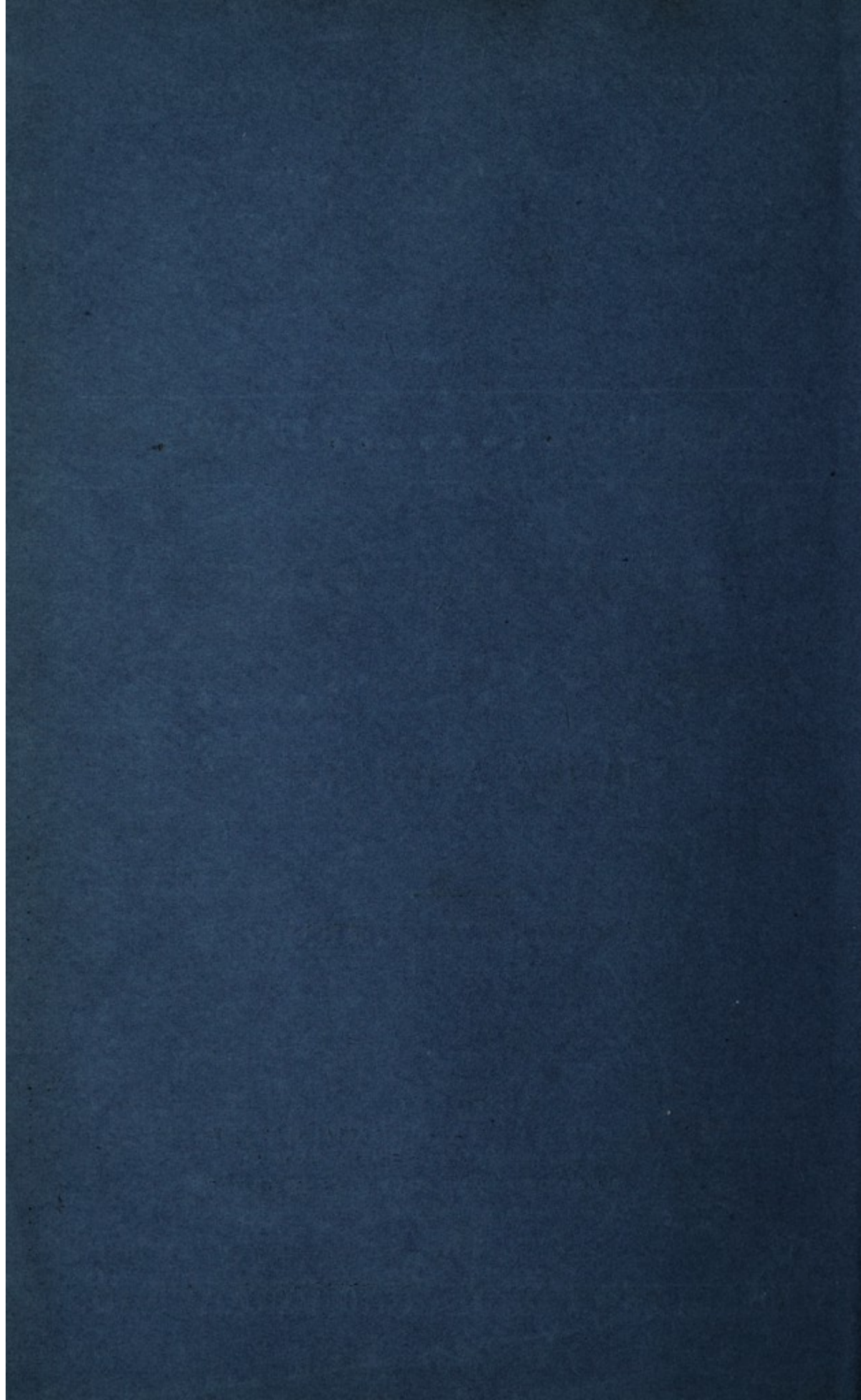
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1857.





A.D. 1856 . . . . . N° 1754.

### Artificial Limbs.

LETTERS PATENT to James Ashman, of Swansea, Glamorganshire, for the Invention of "IMPROVEMENTS IN THE MANUFACTURE OF ARTIFICIAL LIMBS."

Sealed the 23rd January 1857, and dated the 24th July 1856.

PROVISIONAL SPECIFICATION left by the said James Ashman at the Office of the Commissioners of Patents, with his Petition, on the 24th July 1856.

I, JAMES ASHMAN, of Swansea, Glamorganshire, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE MANUFACTURE OF ARTIFICIAL LIMBS," to be as follows:—

The object of this Invention is to manufacture artificial limbs of a lighter and more durable material than that now used, and to give greater freedom of action and more play to these mechanical appliances.

10 The first part of this Invention consists of the use of a new material for the manufacture of artificial limbs; this is composed of butt leather, which is further hardened by being treated with a solution of naphtha and gum shellac, or other similar matters. Over this material a surface of waterproof lining cloth is to be placed, and the whole is to be covered with buck  
15 leather.

Secondly, the Invention consists of the use of a peculiar joint for fastening the upper or thigh part of an artificial leg to the leg and foot, and of a new and peculiar joint for the foot and ankle, so constructed as to give lateral motion to the foot.

20 Thirdly, of the use of an arrangement of mechanism at that part of the foot called the os calcis, consisting of a tube containing four or more metallic

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spiral springs, actuated by a leathern bar, which is fastened to the limb so as to resemble the tendon achilles.

And, lastly, of a peculiar means of supporting the knee joint, by means of a strap fastened to the thigh part of the leg and below the knee by means of a scroll steel spring, giving free motion to the joint in walking, sitting, or riding. In the arm, a similar joint to that of the knee in the leg is used for the elbow, and the material for the socket is the same as that described for the leg.

**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said James Ashman in the Great Seal Patent Office on the 24th January 1857.

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES ASHMAN,** of Swansea, Glamorganshire, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-fourth day of July, in the year of our Lord One thousand eight hundred and fifty-six, in the twentieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Ashman, Her special licence that I, the said James Ashman, my executors, administrators, and assigns, or such others as I, the said James Ashman, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all 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 "**FOR IMPROVEMENTS IN THE MANUFACTURE OF ARTIFICIAL LIMBS,**" upon the condition (amongst others) that I, the said James Ashman, 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 Letters Patent.

**NOW KNOW YE,** that I, the said James Ashman, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this Invention is to manufacture artificial limbs of a lighter and more durable material than now used for the purpose, and also, by the

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particular mechanical arrangements herein-after described, to give greater freedom of action to the different parts of the limb. The material I use to form the body of the artificial limb or limbs is hide treated or prepared with a solution of naphtha and gum shellac, or preparation of other gums, dissolved  
5 in alcohol; or papier machi or vulcanite may be used for the purpose, but I prefer the prepared hide. This treatment of the hide renders it of a horny hardness, and when so prepared it has a semi-transparent appearance, closely resembling horn. The stiffness and rigidity thus imparted to the hide renders it particularly applicable to the manufacture of artificial limbs, as it is capable  
10 of supporting a considerable weight, yet possesses sufficient flexibility to accommodate itself to the stump of the limb.

I will now describe my improvements in constructing artificial limbs, referring to the Drawings accompanying and forming a part of this Specification, and to the letters and figures marked thereon.

15 Fig. 1 represents an artificial leg for a case in which the natural limb has been amputated above the knee. A is a triangular-shaped piece of prepared hide or leather, secured to the high part of the leg B by a pin or screw, on which it turns freely; the piece A fits the hip of the wearer, and the leg is supported partly by a brace or strap, which is attached to the upper corners  
20 of the piece A and passes over the shoulder of the wearer.  $a^1, a^1$ , are two bands of vulcanized india-rubber or other suitable material; these bands admit of the piece A moving in either direction and adapting itself to the movements of the body, the bands  $a^1, a^1$ , serving to restore the hip piece A to a perpendicular position when the wearer rises from a sitting position. The  
25 thigh and leg pieces B, C, are both made of prepared hide or leather, blocked upon a suitable model or mould; they are attached to each other by a pair of joints D. A side view of one of these joints is shown at Fig. 2.  $d^1$  is the lower part of the joint; a portion of the metal is cut away so as to form a shoulder, a circular form being given to the upper part of the remaining  
30 portion  $d^2$ . The upper part of the joint at  $e$  is made of a corresponding form, and the two parts are connected together by a pin at  $e^1$ ; this pin is made with an elliptical-shaped head, as shown by the front view, Fig. 1. Through the lower part of the head a screw or pin  $e^2$  passes; the joint is thus secured by two pins; the weight, however, is not borne by either of them. It will be  
35 seen, upon referring to Fig. 2, that the shoulders made in the upper and lower parts of the joint receive the weight; the thinner portion of each part  $d^1$  and  $e^1$  rests upon the shoulders, thereby relieving the pin  $e^1$  from all strain or wear. Inside the leg piece C is fitted a spindle, which passes through the leg; upon this is fixed a metal box or case containing a scroll spring.

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Fig. 3 is a front view of this part of the mechanism; Fig. 4 a side view of the same. F is the arbor or spindle; G, the scroll spring; H, the box. The spring is fastened at one end to the small barrel on the spindle F, and at the other to the box H; a band or strap I is fastened to the outside of the box. The position of the box is shown by the dotted lines in Figs. 1, 2. The strap 5 or band I is carried up between the leg and thigh pieces, and fastened to the front of the latter. When the wearer sits down the heel is pressed on the floor; the bending of the knee joint causes the strap I to turn the barrel and wind the spring G on the spindle F. When the wearer rises, the pressure on the spring being removed, the strap I is coiled round the barrel, and by this 10 action the limb is straightened. The central part of the foot is made of light wood as far as the fore joint; the whole is covered with leather; it is attached to the leg piece by a stout piece of leather K, Fig. 5, which represents the foot detached from the leg. The joint K is made very strong, and has a certain amount of lateral action, resembling the natural joint; it is secured to 15 the knee piece by a pin L, which passes through the sides of the leg piece and part K. At the heel of the foot is placed a spring or springs M, Fig. 5; if more than one spring is required, they are placed one within the other; the spring or springs are depressed by a stud N projecting from the back part of the leg piece. This arrangement of the springs is designed to imitate the 20 action of the tendon achilles. When the heel is placed upon the ground and the weight of the body thrown upon the springs, their upward pressure brings the fore part of the foot down, in a manner closely resembling the action and elasticity of the natural foot. Upon the instep is secured a piece of leather O; this is for the purpose of resisting the pressure of the boot at that part which 25 would otherwise interfere with the free action of the leg at the ankle. The fore part of the foot is made with a joint, and shaped so as to closely resemble the human foot. The thigh part B is made with eyelot holes, by which it may be laced firmly to the stump. Figs. 6, 7 represent an artificial limb, similar in construction to the foregoing, but adapted for a leg amputated 30 just below the knee; in this the lower part of the thigh piece B is made to receive the knee, the stump is kept bent at a right angle to the thigh; the upper part of the leg piece is slightly modified to adapt it to the form of the thigh piece. Figs. 8, 9 represent thigh and knee pieces for cases where amputation has been performed some distance below the knee, but in which 35 the weight of the body is borne by the thigh piece. The foot used with the foregoing modifications is the same as before described, and shown by Fig. 5.

My improvements in the manufacture of artificial arms and hands consist in making the sockets of prepared hide or leather, as before described, and

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constructing the joints in manner similar to that herein-before described in reference to the knee joint, Figs. 1, 2.

My improvements in the construction of the artificial hand consists in applying to the back of the fore and middle fingers two spiral springs, 5 extending along the back of the hand and imbedded in the material of which it is made; from these springs two artificial ligaments, made of strips of leather, are carried through the fingers and fastened to the fore joints. By this arrangement the fingers are readily contracted by bending them downwards, the springs serving to hold them in that position, or they may as easily 10 be kept extended. In this position the springs are elongated.

The artificial limbs above described are finally covered with leather, and their shape made to correspond closely with the natural limbs they are substituted for.

Having described the nature of my Invention, and the manner of carrying 15 the same into practical effect, I wish it to be understood that I do not confine myself to the precise arrangement of the mechanical details herein-before described, as the same may be varied without departing from the Invention; but what I claim, and desire to secure under the herein-before in part recited Letters Patent, is,—

20 Firstly, manufacturing the principal parts of artificial limbs of prepared hide or leather, papier maché, or vulcanite, as herein-before described.

Secondly, I claim the hip piece, the joint D, whether applied to artificial legs or arms, and the scroll spring and band for straightening the leg, and to assist the action of walking with an artificial leg.

25 Thirdly, I claim the particular construction of the foot, and the application of one or more springs at the heel, as above described.

Fourthly, I claim the application of springs to the back of the artificial hand, as herein-before described.

In witness whereof, I, the said James Ashman, have hereunto set my 30 hand and seal, this Twenty-fourth day of January, in the year of our Lord One thousand eight hundred and fifty-seven.

JAMES ASHMAN. (L.S.)

Witness,

CHARLES BARLOW, Patent Agent,

35 89, Chancery Lane, London.

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LONDON:

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Printers to the Queen's most Excellent Majesty. 1857.



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JAMES ASHMAN (s.s.)

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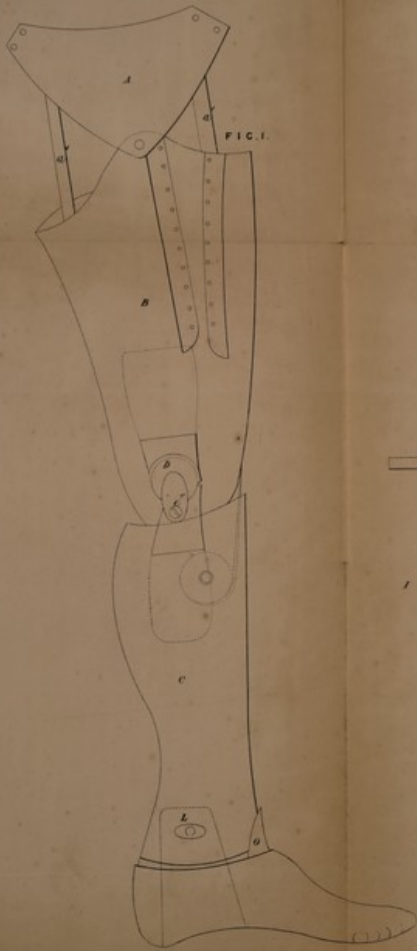


FIG. 2.



FIG. 3.

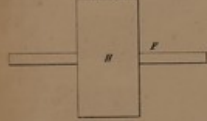


FIG. 4.



FIG. 5.



FIG. 6.

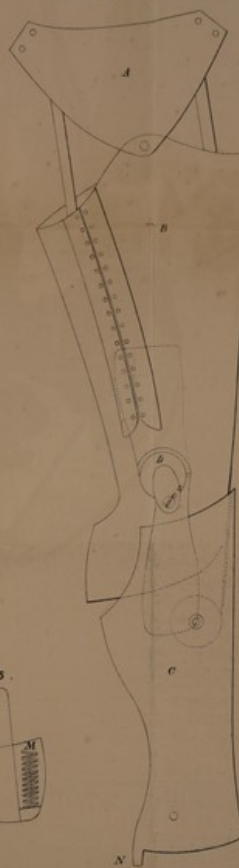


FIG. 7.

FIG. 8.

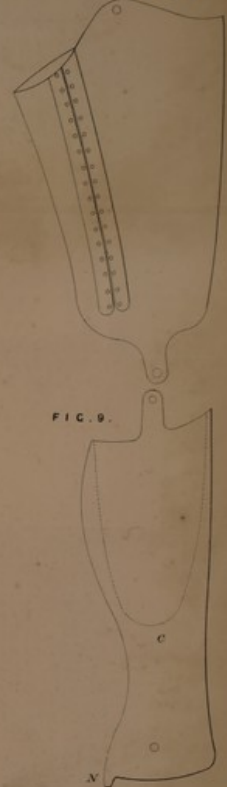
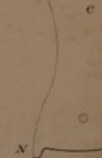


FIG. 9.



The filed drawing is not colored.

