Sheet 1-2 Sheets.

D. Bly.

Artificial Leg.

No. 87,624. Patented Mar. 9, 1869.

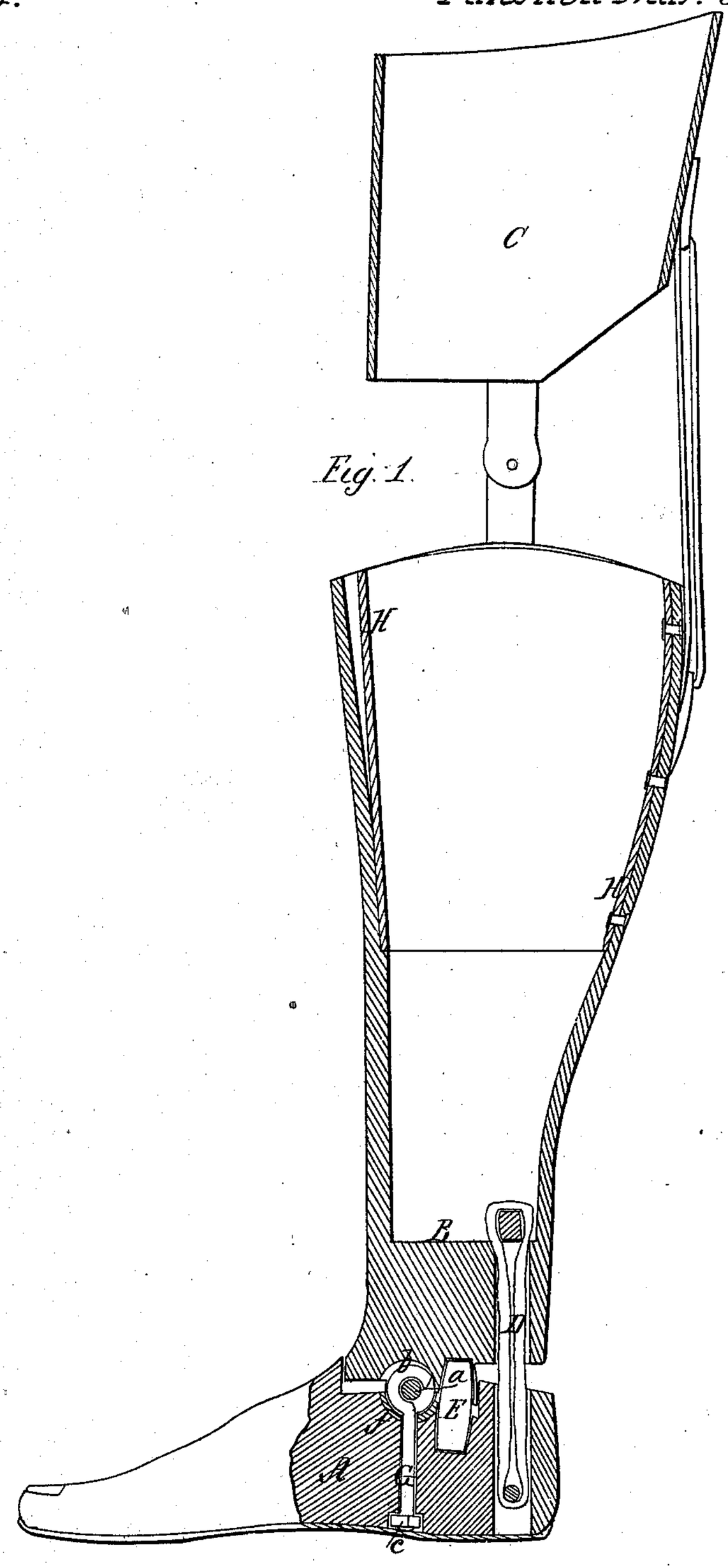

Fig. 1.

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Sheet 2-2, Sheets.

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Fig. 3.

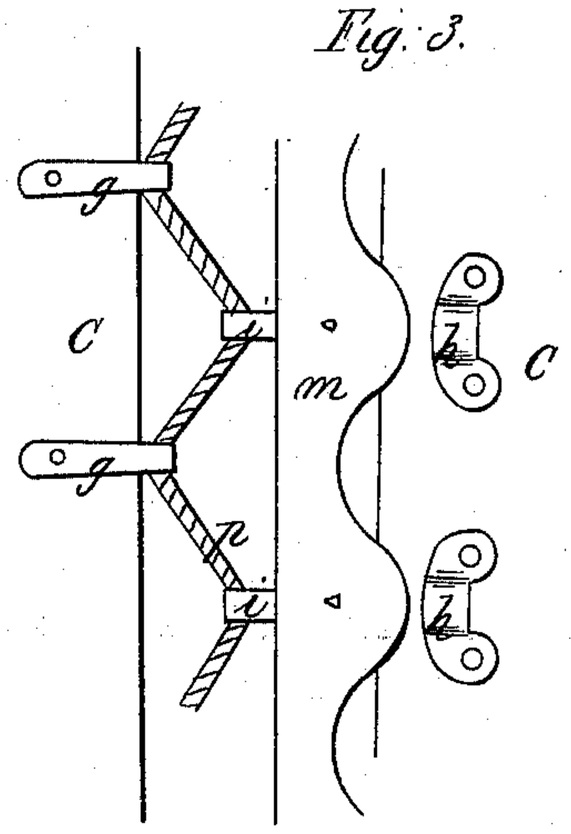


Fig. 4.

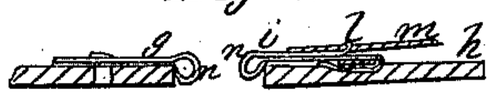
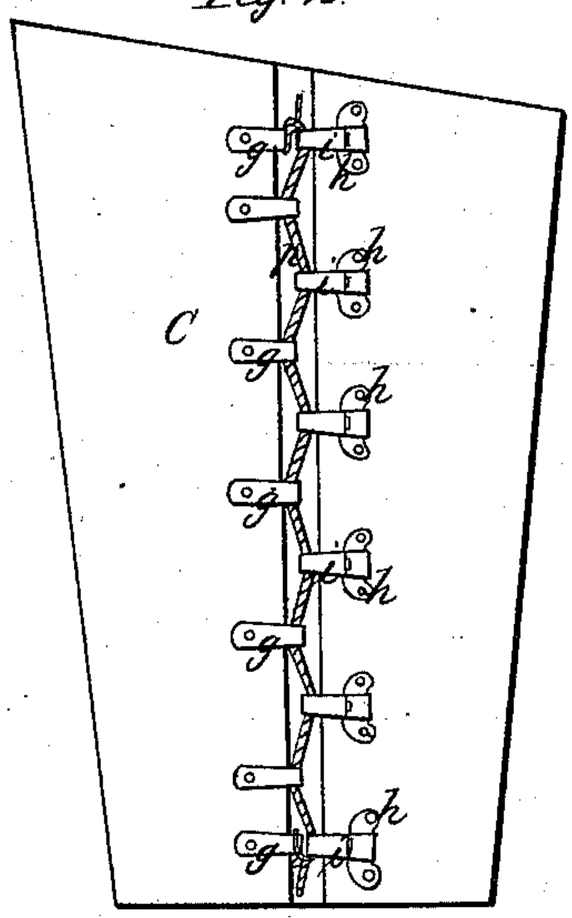
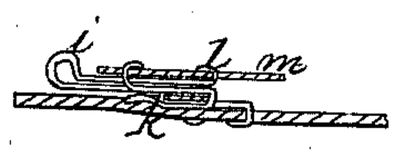


Fig. 5.

Fig. 2.





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United States Patent Office.

DOUGLAS BLY, OF MACON, GEORGIA.

Letters Patent No. 87,624, *dated March* 9, 1869.

IMPROVED ARTIFICIAL LEG.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, DOUGLAS BLY, of Macon, in the county of Bibb, and State of Georgia, have invented a certain new and useful Improvement in Artificial Legs, and lacings for the same; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a central vertical section of my improved leg.

Figure 2, a view of my improved lacing attached to the upper socket of the leg.

Figures 3, 4, and 5, detail views of the lacing.

Like letters of reference indicate corresponding parts in all the figures.

My invention consists in an improved joint connection of the foot with the leg, an improved flexible socket to secure the stump, and an improved lacing to the upper socket.

In the drawings—

A indicates the foot;

B, the leg; and

C, the upper socket, which latter is made of leather, and laced around the thigh, when amputation is below the knee.

A tendon, D, at the ankle, takes the place of the *tendo-Achilles* of the natural leg, and a spring, E, is employed for producing the reaction of the foot.

The ankle-joint is formed by a rounded bearing, *f*, resting in a suitable socket of the foot.

A wooden pivot-pin, *a*, passes through the rounded bearing *f*, and the connection is formed by an open hook, *b*, on the end of the bolt G, which latter passes down through the foot, and is held by nut *c* in the usual manner.

The great advantage of this arrangement is, that the connection at the joint is formed by a wooden pin and metallic eye, instead of two metallic surfaces, as in other devices.

By this means, there is less friction and wear, no creaking or jarring noise, and the joint seldom requires oiling, since, when the oil is once applied, it permeates the wood, and furnishes a constant lubrication. There is also less liability to rust from dampness.

In the contact of two metallic surfaces, the friction is great, and the wear is very rapid, and a disagreeable creaking noise is produced, which can hardly be avoided, even by constant lubrication.

The wooden pin is sufficiently strong, as it only serves to sustain the weight of the foot, the rounded bearing *f* receiving the down pressure in walking.

Besides the above, the open hook *b* allows an easy insertion and connection, and obviates the removal of the joint-bolt to detach the parts, as in other arrangements. This open hook is essential to the use of the wooden pin, as the latter is not removable.

In the upper part of the leg I locate a flexible socket, H, made of strong leather, riveted or otherwise fastened at the rear to the wood. This socket is of suitable length to receive the upper portion of the stump, when amputation is below the knee, and shield the same from rough contact with the wood. It is of somewhat less diameter than the interior space of the wooden socket.

The object of this auxiliary socket is to produce a greater bearing-surface, or contact upon the stump, in all positions, than could be secured were the latter to rest in a rigid and unyielding socket. This it does by being of smaller diameter, and yielding or flexible, and being attached only at the rear, under which condition it is free to adapt itself to the form of the enclosed member at every flexion. For instance, when the stump presses forward, in the act of stepping, the pressure upon the front of the flexible socket will cause it to close at the sides around the member, and thereby bind firmly, yet easily, so as to secure a close and continued connection.

In the same manner, if the stump presses either way to one side, the front and the opposing side of the socket will close firmly around it; consequently the bearing or pressure of the flexible socket against the stump is equalized, or distributed over a greater surface, and therefore is more comfortable to the patient in walking. It also aids materially in walking, by giving a free and easy motion, and making the artificial member, as it were, a flexible and continuous connection of the natural one.

Where the stump simply rests in an unyielding wooden socket, the connection is so loose and irregular, that the artificial member does not readily adapt itself to the motions of the natural one. Besides, the contact is painful and unpleasant, especially under long application. I remedy these difficulties in a most effective manner.

The efficiency of the auxiliary socket is in a great degree due to its being of less diameter than the enclosing wooden one, and its being entirely free to adapt itself to the enclosed stump.

The upper leather socket C, which binds around the thigh, when amputation is below the knee, has heretofore been secured in place by ordinary lacing.

I propose to substitute an improved lacing, which is as follows:

I rivet to one flap or side of the opening of the socket, eyes *g g g*, formed preferably by doubling strips of sheet-metal, with sockets formed on the ends. On the other flap or side, I similarly attach catches *h h h*, preferably also formed from sheet-metal, or other suitable material, of the shape shown.

A suitable cord, *p*, is attached at the bottom, run through the eyes, and attached at the top, with hooks *i i i* strung thereon, corresponding in number and position with the catches *h h h*.

I prefer to form these hooks with double sides, lying flatwise, the lower side turning down and backward, to form the hook proper, *k*, sufficiently closed to form

a spring, to prevent unhooking, and the upper side, having the end *l* pointed, and turning upward vertically, to pass through and head down upon a strip, *m*, of leather, to which the several loose hooks may be attached to keep them in place, or the hooks may be attached in any other suitable manner. This is clearly shown in fig. 4.

In use, to lace thick leather, such as above described, I make the sockets *n n* of the eyes and hooks to turn down, so as to come just opposite the edges of the leather, fig. 4, and thus draw the said edges up in line, face to face, without overlapping. For use in connection with thin leather, however, the sockets may stand above, as shown in fig. 5, which form is most conveniently laced, though not necessary to the result obtained, as ordinary eyelet-holes answer a good purpose in combination with the hooks, as the effect really depends upon the combination of movable hooks with lacings.

The operation of this lacing will be readily understood.

The cord being thus secured at both ends, and of the proper length, the loose hooks *i* are simply carried over, and hooked successively, from bottom to top, into catches *h*, thereby drawing the edges of the leather close together.

The cord, when once arranged of the proper length, retains the parts uniformly the same, or, if at any time it becomes stretched, it can be taken up. This, however, will not often occur; and the facility of securing the hooks, by simply passing them over to the opposite side, insures great facility in fastening and unfastening.

In addition to this, I secure, by this arrangement, a greater facility and expedition in fastening and unfastening, than in any other attachment with which I am acquainted, where a lacing or cord is employed, for I have simply to hook or unhook on one side, whereas, in all other lacings, the parts must be fastened or unfastened on both sides, for instance, where the cord is wreathed from side to side, over hooks.

In addition to the above, in my case, the cord passing through closed sockets, or eyes, it cannot escape, whereas, when open hooks are employed, a slight slack allows the cord to escape, and if it escapes from one, it readily escapes from all. This sometimes occurs when the wearer is walking, and produces much inconvenience.

In shoe-lacings, as well as the leather lacings of legs, a plan has been devised of passing a single cord alternately, from side to side, over points or hooks, and then drawing up at the top to close the flaps. This, however, is not found to work well in practice, owing to the fact that the tops will close first, and then the friction is so great, as the distance increases from the power, that the bottom of the slit will not be closed, or at least the closing will be very imperfectly done.

I obviate all difficulty of this kind, for the loose hooks draw laterally from side to side, at but slight distances from each other, all the way up, being in this respect as effective as buttoning, or other well-known methods of fastening, while the simplicity and expedition of attaching and detaching are unrivalled.

The employment of the strap *m*, connecting the hooks, enables the operator to easily apply said hooks, even in the dark, without trouble, since it gauges their position relatively with the catches.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the ankle-joint, of the wooden pin *a* and open metallic hook *b*, arranged as described, and operating in the manner and for the purpose specified.

2. The combination, with the leg B, of the enclosed flexible socket H, of less diameter than the wooden socket, and otherwise arranged, in the manner and for the purpose specified.

3. The combination of hooks *i* with cord *p* and eyes and catches *g h*, or their equivalents, substantially as herein set forth.

4. The combination of the connecting-strap *m* with the loose hooks *i* and catches *h*, in the manner and for the purpose specified.

5. The sockets *n n*, with the edges of the leather, when combined with the cord *p*, in the manner and for the purpose specified.

In witness whereof, I have hereunto signed my name, in the presence of two subscribing witnesses.

DOUGLAS BLY.

Witnesses:

R. F. OSGOOD,

W. J. CREELMAN.