J. Coombs,

Artificial Leg.

No. 49,234. Patented Aug. 8, 1865.

Fig. 2

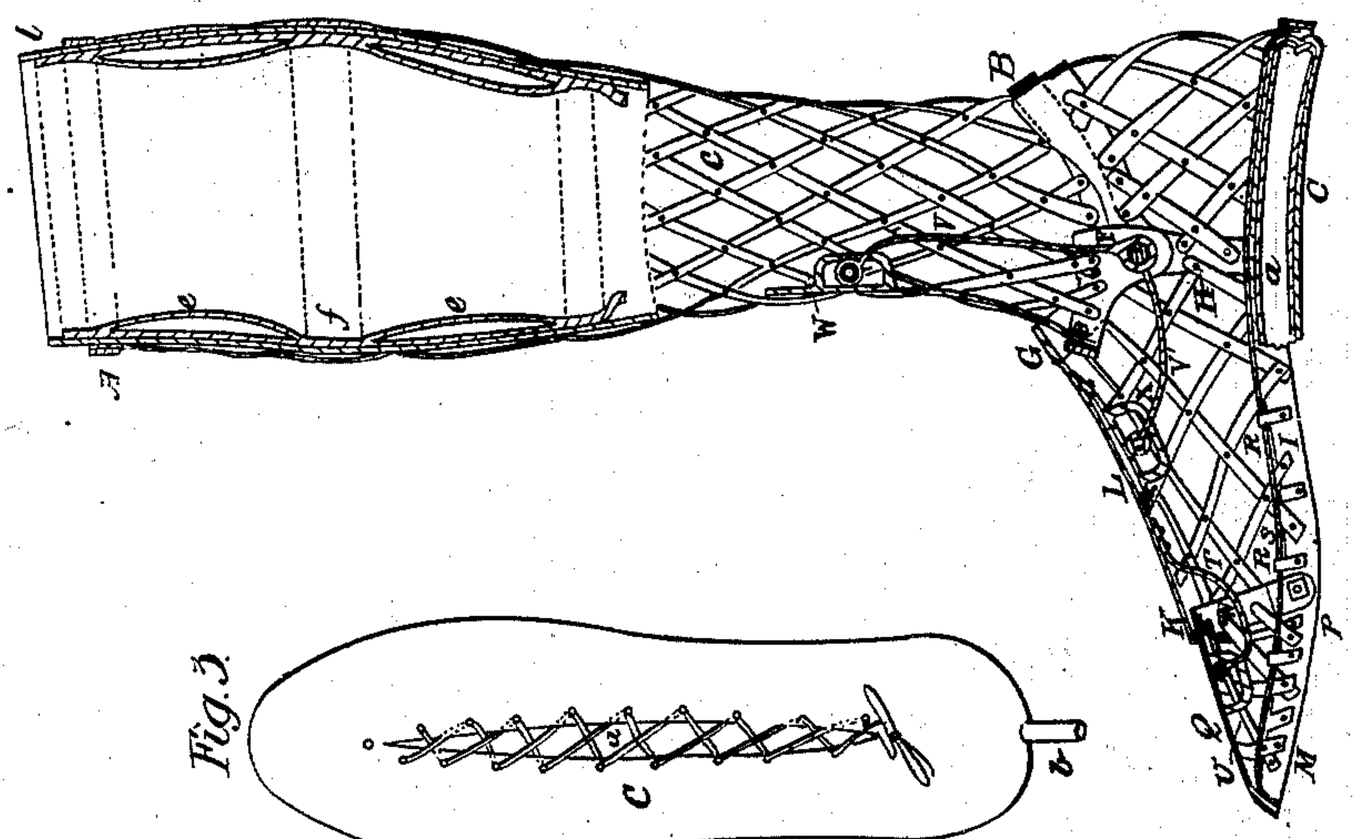
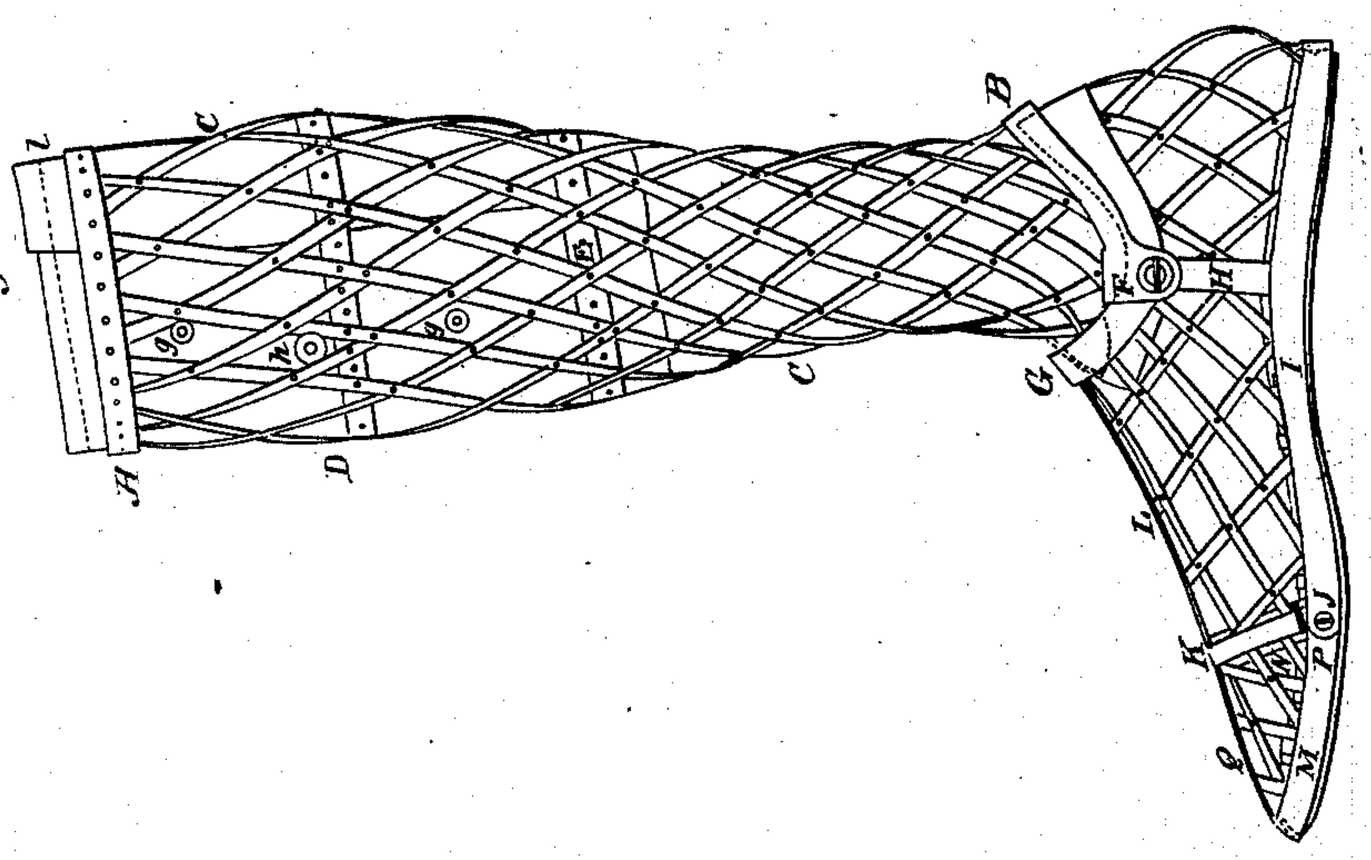


Fig. 3.

Fig. 1



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UNITED STATES PATENT OFFICE.

JESSE COOMBS, OF GREENFIELD, MASSACHUSETTS.

IMPROVEMENT IN ARTIFICIAL LIMBS.

Specification forming part of Letters Patent No. **49,234**, dated August 8, 1865.

To all whom it may concern:

Be it known that I, JESSE COOMBS, of Greenfield, Franklin county, State of Massachusetts, have invented certain new and useful Improvements in Artificial Limbs, as Arms, Legs, Feet, &c.; and I do hereby declare that the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvements without further invention or experiment.

The nature of my invention and improvements consists in making artificial limbs of strips of sheet metal, wood, or other material woven spirally and riveted, or arranged spirally and riveted, to make a very light strong leg, and in arranging an angular spring at the ankle, with one arm working in the leg and the other in the foot; also, in arranging air or water cushions under the foot or feet, inside of the shoe or boot, to enable the wearer to walk without or with far less jar to his system when he steps than he could do without the cushion; also, in making two or more cylindrical air or water cushions, with a vacuum or suction-space between them, around the stump of the natural limb, to hold the artificial limb onto the natural limb.

In the accompanying drawings, Figure 1 is an elevation of a leg and foot with my improvements. Fig. 2 is a section showing it cut perpendicularly and centrally. Fig. 3 shows the cushion for the sole, with its leather covering.

In these drawings, A is the top and B the bottom rim of the leg. These rims A and B are connected by strips of sheet metal or spring-steel C C, arranged spirally in opposite directions, and woven or interlaced, as shown in the drawings, being riveted at the crossings, and their ends riveted to the rims A and B and to the inside circles, D and E, to stiffen it where it is joined to the stump of the natural limb. The lower rim, B, of the leg, by which it is connected to the foot, is made to fold over at the joint, as shown in section, Fig. 2, so that the upper rim, G, of the foot comes between the folded part of the rim B, where the fulcrum-pin F connects the two together, so that as the ankle-joint is worked the rear of the rim B works outside of the rim G and the front of G works outside of B, as shown in Fig. 2. The ears of the rim B are countersunk for the head and nut of the fulcrum-pin F, so as not to make an unnatural projection at the ankle-joint.

The rim G has an arm, H, opposite the fulcrum-pin, projecting down and brazed or fastened to the sole-rim I, which extends around the heel and forward on each side to the toe-joint J.

The foot, from the heel to the toe-joint, is all made together, as shown in the drawings, with a curved plate, K, over the toe-joint, and a plate, L, on the top of the instep, connecting the front of the rim G to the plate K, and all the space between the rim G, the sole-rim I, and plate K is filled with a lattice-work of strips of spring-steel crossing each and riveted, as shown in the drawings, and woven or otherwise, with their ends fastened to the rims and plate.

The sole-rim I, plate K, toe-rim M, and toe-plate N, working under the plate K, are all hinged together on the screws P, which form the toe-joint. The plate N and rim M are connected by the top plate, Q, and all the space between them is covered with lattice-work, as shown in the drawings. The sole of the foot is formed of a lattice of strips R R put across, with their ends turned down and riveted to the inside of the sole-rims, and with one or more pieces, S, put lengthwise and interwoven with the strips R.

The toe-spring T is fastened to the under side of the plate L, and is provided with a roller working on the bracket U, fastened in the plate Q, so as to draw or press the toe down after it is bent up. The arms V V′ of the ankle-spring are nearly at a right angle to each other, with its fulcrum on the pin F, and the friction-roller in the arm V works under the bracket W, fastened on the inside of the lattice-work of the leg, while the friction-roller in the arm V′ works in the bracket X, fastened under the plate L. This ankle-spring holds up the instep of the foot. The lattice-work of the leg may be arranged spirally and riveted at the crossings without being woven or interlaced, if preferred that way.

There is a recess in the sole of the foot for an air-cushion, a portion of which is shown in section in Fig. 2 and in plan in Fig. 3. This cush-

ion consists of a bag, *a*, made of india-rubber cloth, with a tube, *b*, by which it may be blown up and the tube tied to confine the air. It may be used with or without the leather covering *c;* or a covering of cloth may be substituted for the leather covering, which is provided with a laced slit to put in the bag *a*.

To connect the stump of the natural limb with the artificial limb, I first line the lattice of the latter with a piece of calf-skin or other leather, *l*, and then make a circular air-cushion or sleeve. (Shown in section, Fig. 2.) This air-cushion is made cylindrical, with a circular air-space, *e*, in each end of the sleeve, and a space, *f*, between them, as shown in the drawings. Each of the spaces *e*, which form the air-cushions, is provided with an inflating-tube, *g*, which projects through the leather and lattice, so as to blow up the cushions after they are inserted in the leg. The space *f* between the cushions is provided with an exhausting-tube, *h*, so that after the stump of the limb has been inserted the air-space under the rubber, between the cushions, may be exhausted by sucking out the air so as to form a vacuum under the rubber, between the cushions, with sufficient suction to hold the artificial limb onto the stump of the natural limb without the aid of straps or other fastenings.

In case the stump of the natural limb is too short below the knee or other joint to receive the two cylindric air-cushions and the suction-space between them, I make a long sleeve with three cylindric air-cushions in it—to wit, the lower cylindric cushion to go in the top of the artificial limb and support the stump of the natural limb.

The space in the sleeve between the lower cushion and the one next above it I make long enough to reach above the knee, and a little more than one-half of the circumference of this part of the sleeve, in front of the knee, I make of shirred rubber cloth to allow the knee to bend freely and naturally when required. The two air-cushions above the knee and the suction-space between them I make just like those first described for holding the artificial limb to the natural limb, as they are for that purpose.

I contemplate that my improved limbs may be made with elbow or knee joints and lattice-work above them to connect to the stump of the natural limb.

Having described my improvements, I will state my claims as follows, to wit:

1. Making artificial limbs of strips of metal, wood, or other material woven spirally and riveted, or arranged spirally and riveted, substantially as described.

2. The spring V V′ secured at the ankle-joint, with one arm working in the leg and the other in the foot, substantially as described.

3. An air or water cushion for the sole or under the sole of the foot, inside of the boot or shoe, to enable the wearer to walk without or with far less jar to his system when he steps than he could do without the cushion.

4. Making two or more cylindric air or water cushions, or cushions of other materials, with a vacuum or suction-space between them, around the stump of the natural limb, substantially as described, to hold the artificial limb onto the natural limb.

JESSE COOMBS.

Witnesses:
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