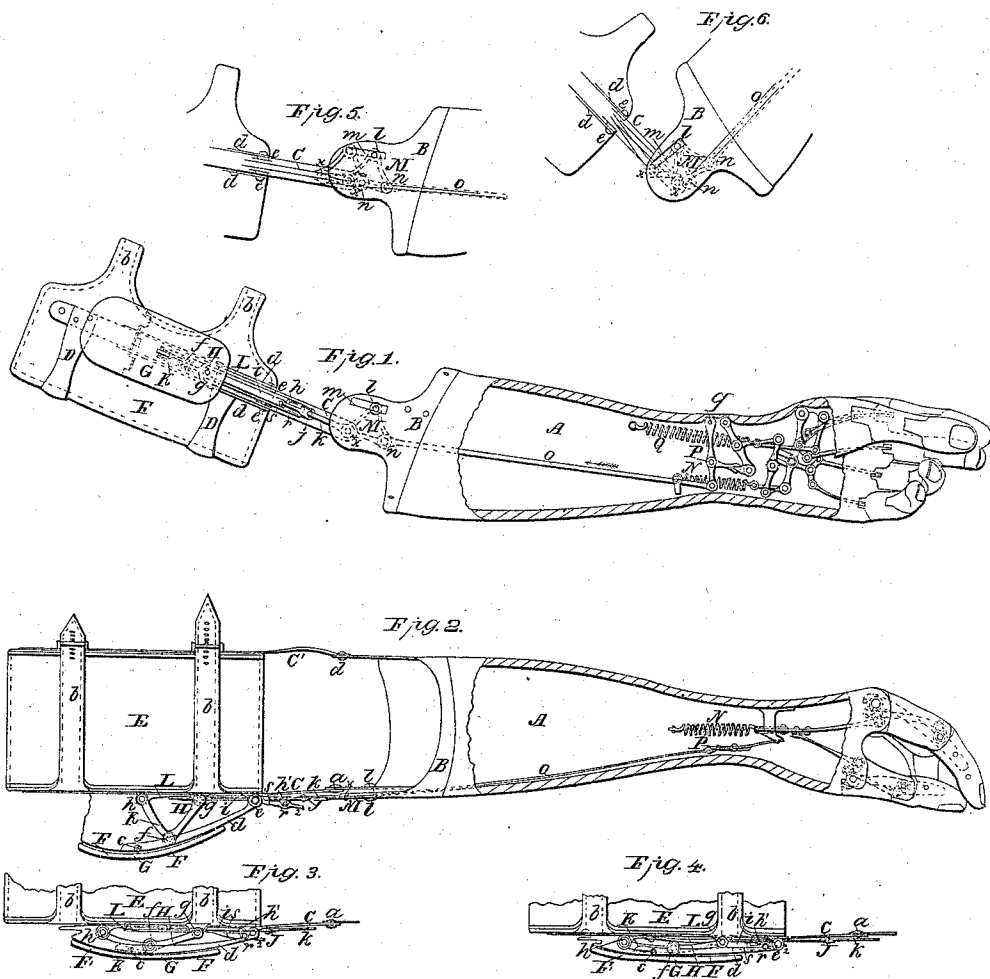


E. Spellerberg,
Artificial Arm.

N^o 42,515.

Patented Apr. 26, 1864.



Witnesses:
William Shreve.
Theodore Bergner.

Inventor:
Edward Spellerberg.

UNITED STATES PATENT OFFICE.

EDWARD SPELLERBERG, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN ARTIFICIAL ARMS.

Specification forming part of Letters Patent No. 42,515, dated April 26, 1864.

To all whom it may concern:

Beit known that I, EDWARD SPELLERBERG, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Artificial Arms; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon.

My invention consists, mainly, in an improved method of actuating the fingers and thumb, whereby the grasping and holding of objects and release of the same, are accomplished in a more natural and perfect manner than by any of the movements and mechanism heretofore employed. In artificial arms of various construction now in use the opening movement of the hand is obtained by stretching the arm from the body and throwing the shoulder-blade into a peculiar position, requiring great effort and an unnatural position of the upper body, whereupon a forward leaning of the body and return of the shoulder to its natural position are required to allow the hand to close.

With the use of my improved mechanism, however, the opening of the hand is derived from a pressure of the upper arm against the side of the chest, while the release of this pressure closes the hand.

Another important feature of my invention consists in the employment of a peculiar device at the elbow-joint for transmitting the movements to the hand, said device being so arranged as to actuate the hand in any position of the elbow-joint, from a straight extension of the arm to extreme upward bending of the forearm.

That portion of the improved mechanism which, by pressure against the side of the body, actuates the hand is so contrived as to enable the wearer of the limb to throw it instantly out of action whenever he does not require the use of the artificial hand. By so doing the above parts are so diminished in bulk as to lie close against the upper arm, thus causing not the slightest inconvenience to the wearer. The throwing into action of the hand mechanism is also readily effected at any moment it may be required.

In order that my said invention may be fully understood, I will now proceed more particularly to describe the construction and operation of the same.

On reference to the drawings making part

of this specification, and in which similar letters of reference allude to like parts in the several views, Figure 1 is a side view of an artificial arm of my improved construction, partly drawn in section. Fig. 2 is a plan of the same, also represented partly in section, the pressure pad and mechanism being in this view represented in the position they occupy when the fingers are closed. Fig. 3 exhibits the pressure-pad and its mechanism in their position when the hand is opened by the pressure of the pad against the side of the body. In Fig. 4 the pad and its mechanism are shown in their disconnected condition. Fig. 5 is a view of the elbow-joint in an extended position, the device for transmitting movement from the pad to the hand mechanism being represented in extreme positions in red and black lines. Fig. 6 is a similar view of the same parts, representing their action in a contracted position of the elbow-joint.

The artificial arm represented in the drawings is of the construction employed when the limb has been amputated below the elbow, the hollow socket-shaped lower arm, A, serving to receive the stump remaining below the elbow. It will, however, be readily understood that my improvement is equally well adapted where the arm has been amputated immediately above or at the elbow. In such cases the usual appliances for retaining the elbow-joint in any required position are added, while the devices for actuating the hand remain the same as shown and hereinafter described. The lower arm, A, which may be formed of leather, india-rubber, or any of the usual materials, is provided with a metallic band or elbow piece, B, to which are jointed at *a a* the steel strips *C C'*. These strips are united by elastic semicircular steel bands *D D*, which bands carry with the strips *C* the leather clasp *E*, the latter adjusting itself to the size and shape of the stump, and serving to secure the artificial arm thereto by means of its buckle-straps *b b*. The pressure-pad is so placed on the inner side of the arm as to rest against the side of the body, and consists of two thin metallic plates, *F F'*, hinged together at *c*, and covered by a leather cushion, *G*. To the plate *F* of the pad two forward-extending arms, *d d*, are attached, which are hinged to the strip *C* at *e e*. Beneath the pad are two links, *H* and *K*, jointed at *f*, of which the former vibrates upon fulcrum-pins *g g* in *C*, while *K* is hinged at *h* to a slide, *L*,

resting upon the strip *U* and guided at its sides by being confined between lugs at the joints *e e* and *g g*. Upon reference to Figs. 2, 3, and 4 the relative position of these parts and the manner in which the links *H* and *K* and the slide *L* are actuated by the pressure-pad will be readily understood, *e e* being the permanent fulcrums of a knee-joint formed by the arms *H* and *K*. These arms will, upon a depression of the pad, draw the slide *L* upward. (See Fig. 3.) This slide *L* then, by means of intermediate connections, (hereinafter fully described,) actuates the mechanism of the hand. The arrangement of the finger-joints and of the levers and links in immediate connection therewith and contained in the interior of the hand are not a part of my invention, as they are substantially similar to those already in common use, and will, therefore, (as they are, moreover, clearly shown in Figs. 1 and 2 of the drawings,) not require a more minute description here than is requisite in explaining the operation of my improvements.

The slide *L* is at its forward end provided with a socket, *h'*, for the reception of a flat rod or link, *i*, resting beyond the socket upon the outer flat surface of *L*. This rod *i* is at *j* jointed to another shorter link, *k*, the forward end of which extends to the elbow-joint, and is here hinged at *x* to a bell-crank, *M*. This bell-crank has its fulcrum upon pins *l*, resting in slotted holes *m* in the elbow-piece *B* of the forearm, and has at its third joint, *n*, a forward-extending flat rod, *o*, attached, which at its other extremity connects with a vibrating arm, *p*, having its fulcrum at *g*. When by depression of the pad the rod *o* is through the described intermediate connections pulled in the direction of its arrow, (see Fig. 1,) it so actuates through the arm *p* the mechanism of the hand as to straighten out the thumb and fingers and separating them for grasping an object. In this open position the hand continues as long as the pad remains depressed. As soon, however, as the pressure ceases, by moving the upper arm slightly outward from the side, the rod *o* and all its connections are by the tension of spiral springs *N* and *Q* moved in the opposite direction to that indicated by the arrow in Fig. 1, the fingers being thus contracted and the pad elevated to the position shown at Fig. 2. To the socket *h'* of slide *L* is attached a small latch, *r*, which is provided with a locking-pin, *s*, passing through the top of the socket and entering a hole of corresponding size in the rod *i*, this rod being thus secured to the slide *L* and made to transmit the sliding movement of the latter, as above described. To disengage the pressure-pad, for the purpose of diminishing its bulk when the hand mechanism is not required, the wearer has simply to depress with his remaining hand the tail-piece 2 of the latch *r*, and so disconnect the rod *i* from the slide *L* by withdrawing the pin *s* from its hold in rod *i*. This rod then remains in the position in which it is

held by its connection with the hand mechanism, while the slide *L*, being detached from it, will yield to the depression of the pad until the links *H* and *K* are straightened out and rest upon *L*. (See Fig. 4.) The pad, being thus permitted to lie close against the arm, will not in the least inconvenience the wearer at times when he does not require the use of the hand mechanism. To throw the pad and its connections into action, the wearer has but to press against the upper end of slide *L*, so as to push it forward until the locking-pin *s* of latch *r* takes hold of the rod *i*, the position of arms *H* and *K* and pressure-pad being thereby changed to that shown in Fig. 2.

The manner in which the reciprocating movement of slide *L* and rod *o* is transmitted by the bell-crank *M* alternately from one to the other at any position of the elbow-joint will be readily understood upon reference to Figs. 5 and 6. As long as the forearm is extended or forming an obtuse angle with the upper arm, (as drawn at Fig. 5,) the bell-crank *M* acts as a plain link-connection, and its fulcrum-pins *l l* are carried back and forward in the slots *m* of the elbow-piece *B*. When, however, the position of the arm is changed to an acute angle, (as in Fig. 6,) the position of the slots *m* in *B* is so altered in relation to the line of motion of link *k* and its upward connections as to cause the bell-crank *M* to vibrate on its fulcrum-pins *l* without sliding in the slots *m*. At certain intermediate positions of the arm between the extremes shown the action of the bell-crank *M* becomes divided between a partial sliding of its pins *l* in the slot *m* and a radial movement of the same.

Having thus described the nature of my invention and the construction and operation of the parts constituting the same, I wish to be understood as not desiring to limit myself to the described combination and arrangement of the parts in every minutia; but

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

1. The described method of actuating the hand mechanism by a pressure-pad attached to the inner side of the arm beneath the shoulder-joint, and deriving its action from pressure of the upper arm against the side, substantially as and for the purpose specified.

2. The employment of a bell-crank, *M*, at the elbow-joint for transmitting motion from the pad to the hand mechanism, and vice versa, the fulcrum pin or pins *l* of said bell-crank being confined in slots *m* in the elbow-piece *B*, the whole operating substantially in the manner and for the purpose set forth.

3. Disconnecting the pressure-pad from the hand mechanism by means of the latch *r*, operating as described, or in any manner equivalent thereto, for the purpose set forth.

EDWARD SPELLERBERG.

Witnesses:

VALENTIN SCHRK,
THEODORE BERGNER.