D. M. Kolbe,

Artificial Arm.

No. 45,052 Patented Nov. 15, 1864.

Fig. 3.

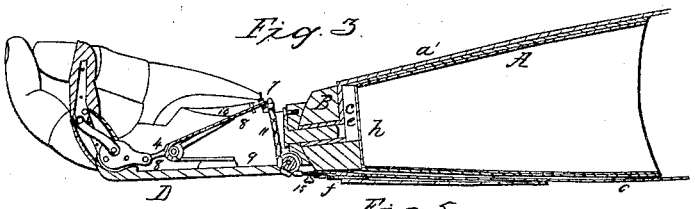


Fig. 5.

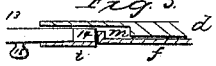


Fig. 6

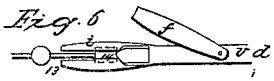


Fig. 1.

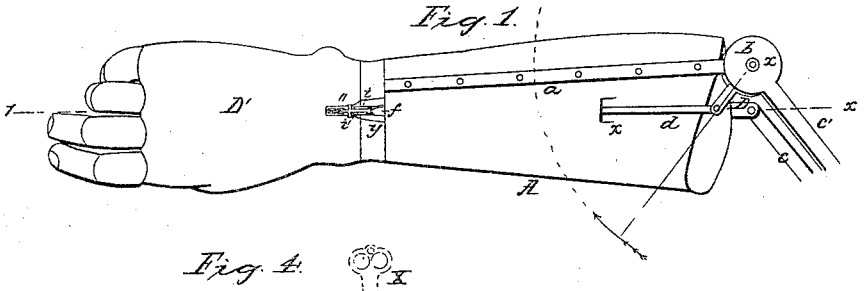


Fig. 4.

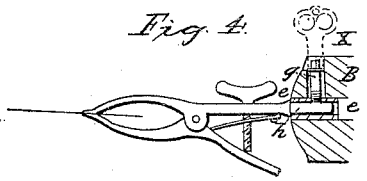


Fig. 2.

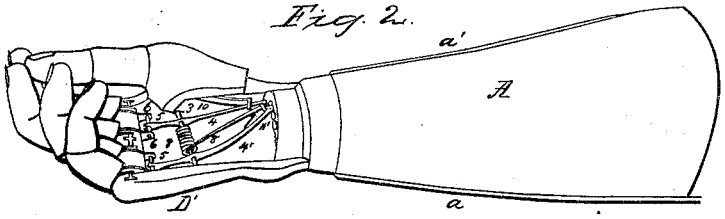


Fig. 7.

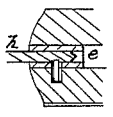
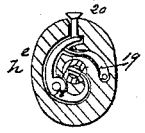


Fig. 8.



Witnesses:
H. Albert Steele.
Charles Howson

Inventor:
Henry Howson
(Per C. Howson)
Atty for D. M. Kolbe.

UNITED STATES PATENT OFFICE.

DIETERICK W. KOLBE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN ARTIFICIAL ARMS.

Specification forming part of Letters Patent No. 45,052, dated November 15, 1864.

To all whom it may concern:

Be it known that I, DIETERICK W. KOLBE, of Philadelphia, Pennsylvania, have invented certain Improvements in Artificial Limbs; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists, first, in devices, described hereinafter, or their equivalents, so arranged in respect to an artificial arm and detachable hand and so operating that the mechanism in the arm may be connected to or detached from that in the hand; secondly, in certain levers so arranged within the hand that but a slight movement of the arm will be required for operating the mechanism within the fingers.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is an exterior view of an artificial hand and lower part of an artificial arm constructed according to my improvement; Fig. 2, an inverted view of the arm and hand, the palm of the latter being removed to show the mechanism for operating the fingers; Fig. 3, a section on the line 1 2, Fig. 1, the palm of the hand being up; Figs. 4 and 5, detached sectional views; Fig. 6, an inverted plan view of Fig. 5, and Figs. 7 and 8 sectional views showing a modification of some of the devices used in my improvement.

Similar letters refer to similar parts throughout the several views.

To a leather case, A, corresponding in form to that of the lower part of the natural arm, are secured the metal strips *a a'*, attached at their lower ends to or forming part of a cross-strip, *c*, from the center of which projects a metal tube, *e*. Attached to the lower end of the case A, surrounding the tube *e*, is a wooden block, B, constituting what is technically termed the "stump" of the artificial arm. To the upper end of the strip *a* is jointed a rod, C, and to the end of the strip *a'*, a rod, C', is jointed, a disk, *b*, on the lower end of this rod, having on the inner side a pin, which engages, in the manner described hereinafter, with a lever, D, jointed at one end to the end of the strip *a'*. To the other end of the lever D is connected the end of a rod, *d*, which enters the leather case A at a point, *x*, and projects from the same at a point, *y*, into a groove in the stump. At the lower end of the rod *d* are two lips, *i i*, bent upward and over the rod, so as to almost inclose a space gradually contracting in size toward the end of the rod, there being a narrow space between the edges of the lips, for a purpose described hereinafter. A flat spring, *f*, is jointed at *v* to the face of the rod *d*, and on the front end of the spring is a lip, *m*, which, when the spring is in the position shown in Fig. 5, projects into a depression in the rod *d* at the rear of the lips *i*.

The parts composing the body and members of the hand D', as well as the mechanism within the fingers and thumb, are of a character too well known to those engaged in the manufacture of artificial limbs to need particular description. From that portion of the hand which is adjacent to the stump B projects into the tube *e* a pin *h*, which is secured at its inner end to a plate, *o*, a square-headed screw, *g*, passing through the tube *e* and bearing with its lower end on the rod *h*. On a rod, 3, which extends across the hand, work two levers *g*, 4 and 4', the short end of each lever being slotted so as to embrace a cross-piece, 5, secured at each end to the end of a lever, 6, which is so connected to the mechanism within one of the fingers that as the end of the lever 6 is raised the fingers will be extended. The longer ends of both levers 4 and 4' are connected to a pin, 7, and through the center of this pin passes the end of a rod, 8, which is a continuation of a spring coiled round the rod 3, the other end resting upon a pad, 9, in the center of the hand, this spring tending to maintain the levers 4 in the position shown in the drawings.

One end of a lever, 10, engages with the lever 4 so as to rise and fall with the latter, the other end of the lever 10 being so connected to the mechanism in the thumb that the latter will be raised from contact with the fingers when the long arm of the lever is depressed, and lowered when the lever is raised.

A chain, 11, connected at one end to the end of the rod 8, passes round a pulley, 12, and through an opening in the back of the hand, where it is jointed to a rod, 13, on the end of which is a head or enlargement, 14, the rod, with the exception of the head, being of such

a thickness as to pass freely between the lips *i* at the end of the rod *d*.

The rods *c* and *c'* are attached to the stump of the natural arm by straps or laces in the ordinary manner. The hand is then secured to the stump B by introducing the pin *h* into the tube *e*, and turning the screw *g* by means of a key, X, applied to the square head of the same, until the end of the screw is brought firmly down on the rod *h*. The spring *f* is then turned to one side, as shown in Fig. 6, and the fingers of the hand extended so as to allow the chain 11 to be drawn through the hand to such an extent that the rod 13 can be introduced between the lips *i* and drawn forward, the head 14 being thus brought into the opening inclosed by the lips *i*, the contracted end of which prevents its escape in one direction, while the lip *m* on the spring *f* (which is brought to the position shown in Fig. 5) prevents its escape in the other direction, all the parts now being in the position shown in the drawings.

As the lower part of the arm is moved in the direction of the arrow round the point *x*, Fig. 1, the lever D is brought in contact with the pin on the disk *b*, which, by preventing the further movement of the lever, causes the rod *d* to recede. As the rod *d* moves back, it draws with it the chain 11, and depresses the ends of the levers 4, thereby raising the ends of the levers 6 and 10, and extending the fingers and thumb. A pen or other similar article may now be placed in such a position that it will be grasped and firmly held between the fingers and thumb, when the latter are brought together by moving the arm back to its former position.

An artificial hand, although it can be readily employed to hold a pencil or pen, or to pick up and carry papers, &c., is not suitable for holding tools, which under many circumstances are required to be used by those engaged in manual occupations.

In the artificial limbs above described, the rod 13 may be detached from the rod *d*, and the screw *g* loosened so that the hand may be removed, the tube *e* in the stump B forming a socket into which tools of any suitable character may be introduced and secured by the screw *g* in the same manner as the hand, as shown in Fig. 4.

In some instances where the tools have to be very frequently changed, too much time is required in order to secure them by means of a screw. I have therefore shown in Figs. 7 and 8 a modification in which the tool is retained by a catch, 18, the point of which drops into a depression in the rod *h*, when the latter is introduced into the tube, and is maintained in this position by a spring, 19, the point of the catch being raised and the rod instantly released by pressing on the button 20.

In an artificial limb in which the hand is permanently secured to the arm, the wearer is prevented from engaging in any employment requiring the use of tools to which the hand is not adapted. In this case, also, the hand cannot be removed for repairs or other purposes without removing the entire limb.

It will be apparent that in a limb of the character above described not only can tools of any desired description be employed, but the facility with which the hand can be removed from or secured to the stump and its mechanism detached from that of the arm or reconnected to the latter, constitute advantages which render a limb of such a character extremely desirable, and especially adapted to those whose means are too limited to enable them to purchase an entire new limb for every style of tool which they may desire to employ. By the use of the levers 4, also, motion may be conveyed from the arm to the fingers with but little loss of power from friction or other causes, while the levers are simple and cheap, occupy but little room, are not liable to become deranged, and require but a slight movement of the arm to operate them.

I wish it to be understood that I do not desire to confine myself to the precise devices herein described for connecting the hand to the stump, or for connecting the mechanism of the hand to that of the arm, as it will be apparent that other devices may be employed without departing from the main features of my invention.

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

1. The within described devices, or their equivalents, so arranged in respect to an artificial arm and detachable hand and so operating that the mechanism in the arm may be connected to or detached from that in the hand, substantially as specified.

2. The levers 4, arranged and operating in respect to the mechanism in the fingers and thumb substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

D. W. KOLBE.

Witnesses:

CHARLES E. FOSTER,

W. J. R. DELANY.