E. Snellerberg,

Artificial Arm.

No. 51,238. Patented Nov. 28, 1865.

Fig. 1

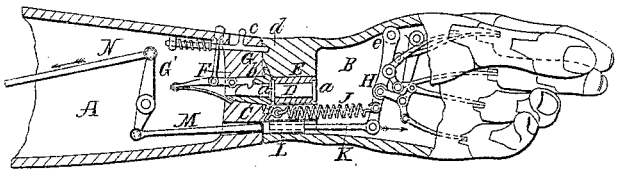


Fig. 5

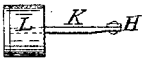


Fig. 3

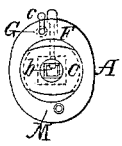


Fig. 4

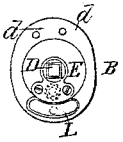


Fig. 2

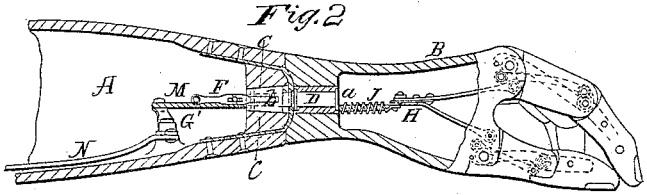


Fig. 6

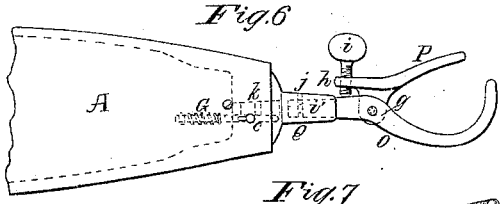
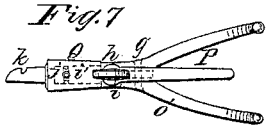


Fig. 7



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IMPROVEMENT IN ARTIFICIAL ARMS.

Specification forming part of Letters Patent No. **51,238**, dated November 28, 1865.

To all whom it may concern:

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

My invention consists, first, in so attaching the hand to the artificial forearm that the position of the hand shall, by turning in its socket, be adjustable within the circular limits requisite to make its position the most natural and convenient one for any particular occupation, the mechanism for imparting movement to the fingers being to this end so contrived that it will without separate adjustment actuate the fingers in any of the various positions the hand may occupy in its socket.

The improvement further consists in so contriving the parts which connect the hand mechanism with the mechanism in the upper arm that the hand may be detached from the arm in a simplified manner by merely withdrawing it from its fastening in the socket, without separately detaching the moving parts, as has been required with the variously contrived detachable hands and mechanism heretofore constructed. In regard to replacing the hand, the same advantages are obvious in my improvement, since simply refastening the hand in its socket also places the moving parts in proper connection for their relative functions.

A third feature of my invention consists in an improved instrument attached to the wrist-socket in place of the detachable hand, which instrument, although similar in other respects to well-known devices for grasping various tools or objects, is provided with a swiveling movement on the socket-pin, whereby its efficiency is greatly increased.

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

On reference to the drawings making part of this specification, and in which similar letters of reference allude to like parts throughout the several views, Figure 1 is a side view of my improved artificial arm, partly shown in section. Fig. 2 represents the improved arm, partly in section, viewed transversely to Fig. 1. Fig. 3 is an end view of the wrist-socket in the forearm. Fig. 4 is an end view of the wrist part of the detachable hand fitted to the socket in Fig. 3. Fig. 5 is a detached view of a part of the improved hand mechanism. Figs. 6 and 7 show the improved swiveled grasping-instrument fitting the wrist-socket in place of the detachable hand.

A is the fore part of the artificial arm, the elbow-joint and upper part of which are not represented, since my present improvements are nowise connected with those parts and their mechanism. The arm is shaped to represent as closely as possible a natural limb, and may be made of wood, leather, or any of the materials usually employed in their construction.

The hand B, generally made of hard tough wood or india-rubber, is jointed to the forearm at the wrist in the following manner: The part A is provided with a metallic socket, C, which is securely fastened thereto, as seen in Fig. 2. Into the slightly-tapered square hole of this socket is fitted the projecting portion of a pin, D, in the hand B. This pin turns freely in a ferrule, E, and is confined endwise within the same by collars *a a* at both ends of the ferrule. The outer end of the socket C is so shaped as to cover nearly the whole surface of a convex bulb or projection on A, the hand B having a corresponding circular concavity at this joint. The projecting square end of the pin D is notched, as shown in Fig. 1, so that when pushed into the socket C the tooth *b* of a spring-latch, F, will securely retain it in position. The hand, when thus attached to the forearm A, is still capable of being turned upon the cylindrical portion of the pin D in the ferrule E. Only a limited portion of a revolution of the hand is, however, sufficient to make it assume a natural position for any of its various uses; and in order to confine this torsional or swiveling movement within the proper limits a small spring-bolt, G, is provided in A in the most convenient position for actuating the same by means of a knob, *c*. The projecting end of this bolt enters the small coinciding cavities *d d* in the hand. Of these cavities only two are shown in the drawings, while any desired number of them may be provided for securing the hand in a variety of positions.

The mechanism within the palm of the hand and the method of jointing the fingers are precisely the same as represented in my patent of April 26, 1864, and will require no further detailed description, inasmuch as they do not form any part of my present improvement.

The lever H in the hand, actuating through the various small links and connections the fingers, causes the latter to separate for grasping an object by being vibrated on its axis *e* in the direction indicated by an arrow, Fig. 1, while the spiral spring J serves to draw the lever H in the opposite direction to close the fingers.

Instead of a solid or coupled rod, as I have heretofore used for transmitting the forward movement to the lever H from another lever, G′, in the forearm, I have, in order to admit of ready detachment of the hand, and to permit also the above-described change of position of the same, contrived the following arrangement of parts for transmitting motion from the upper arm to the hand mechanism: To the lever H is jointed a short stem, K, having at its other end the flat curved head L, which is confined within a curved slot in the solid part of the hand at the wrist end, and which, when drawn back by spring J to the position shown in Fig. 1, is even with the surface of the wrist-joint. The axis of the curve of the head L is concentric with that of the socket-pin D. (See Fig. 4.) A plain round rod, M, is hinged to the lever G′ in the forearm, its other end projecting through the wrist end so as to bear against the head L. It will now be readily seen that when motion in the direction of its arrow, Fig. 1, is given to a rod, N, (by means of any of the various devices provided in the upper arm for actuating the hand mechanism,) the rod M will move forward, and, by pressing upon the head L of stem K, actuate the lever H, and through it the finger mechanism, as before described. Upon release of the force applied to open the hand the lever H is, by means of the spiral spring J, drawn back to the position shown in Fig. 1, and thus the block L will in turn push back the rod M, the lever G′, and its upper attachments to their former neutral position. The surface of the curved block L on stem K covers a sufficient portion of the circle to allow the rod M to act upon it, and vice versa, in any position of the hand within the limits of its circular motion on the socket-pin D.

From the foregoing description the marked advantages of my improvement will be easily understood: On the one part it greatly simplifies the detachment of the hand by doing away with the necessity of disconnecting the mechanism—an item of great importance, since the wearer of the artificial limb has but one hand left to perform the operation, which, if at all complicated, will be a very tedious one in cold weather or when a glove is worn. The most valuable feature of the described improvement consists, however, in enabling the wearer of the limb to adjust the hand to any desired position in its socket-bearing, and yet to retain full use of the hand mechanism for grasping or carrying objects in any of these various positions. Especially for writing and in similar delicate uses of the artificial hand it is a very important gain to be able to place the hand in the most convenient position without the least strain upon the stump of the arm to which the same is attached.

The construction of the improved swiveling or self-adjusting grasping-instrument will be readily understood upon reference to Figs. 6 and 7. It consists of a peculiarly curved fork, O, to which is jointed at *g* a third prong, P, the short arm *h* of which is provided with a thumb-screw, *i*, for clamping the object to be grasped between the prong P and the curved ends of the fork O. The round backward extension *i′* of this fork is so fitted into a socket of the wrist-pin Q that it freely turns in the same, but is prevented from sliding endwise by a small pin, *j*, entering a circular groove in *i′*. The wrist-pin Q is provided with a tapered square end, *k*, fitted to the socket in the forearm, in which it is securely held by the above-described spring-latch F.

Various practical tests of this improved instrument have given the most gratifying results. By its use men have been enabled to guide the handle of a shovel, hoe, or spade, and to use other implements which they could not have handled efficiently with a grasping-instrument secured rigidly in the wrist-socket, while one man, to whom an unusually strong arm and swiveled grasping-tongues were furnished by me, has even succeeded in plying almost daily by this means an ax for chopping wood.

I am fully aware that artificial arms with detachable hands are old and in common use, and that also various means have been devised for disconnecting the finger mechanism of detachable hands from the parts actuating the same; but none of these accomplished the objects effected with my improvement.

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

1. Making the hand adjustable in the wrist-socket in any manner equivalent to that herein described, when the parts transmitting motion to the finger mechanism are constructed relative to this hand adjustment, substantially as and for the purpose specified.

2. So actuating the finger mechanism of a detachable hand by the described devices or their equivalents that the hand can be removed from the wrist-socket without separately disconnecting its mechanism from that of the arm.

3. Providing the described grasping-instrument or its equivalent with a swiveling socket, as and for the purpose set forth.

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