T. Uren,

Artificial Arm.

No. 48,002. Patented May 30, 1865.

Fig: 4.

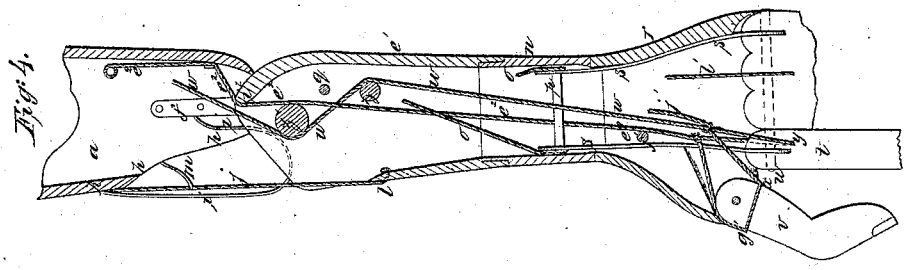


Fig: 3.

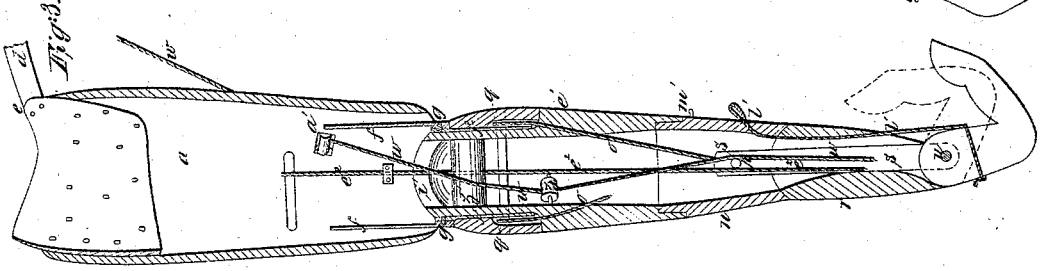


Fig: 2.

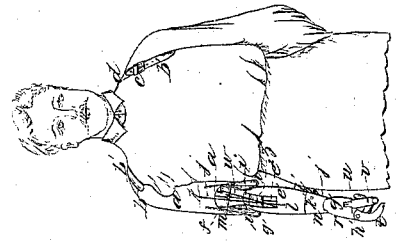
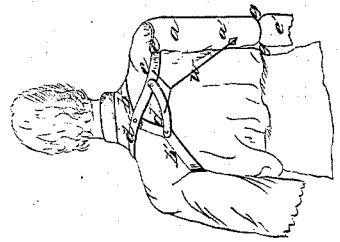


Fig: 1.



Witnesses:
Jno. A. Briscoe
Andrew de Lacy

Inventor:
Thomas Uren

UNITED STATES PATENT OFFICE.

THOMAS UREN, OF NEW YORK, N. Y.

IMPROVEMENT IN ARTIFICIAL ARMS.

Specification forming part of Letters Patent No. **48,002**, dated May 30, 1865.

To all whom it may concern:

Be it known that I, THOMAS UREN, of the city, county, and State of New York, have invented certain new and useful Improvements in Artificial Arms and Hands; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a rear elevation of the arm as applied to an upper amputation; Fig. 2, a front elevation; and Figs. 3 and 4, longitudinal sections through the center of the arm, and taken at right angles to each other.

The same letters indicate like parts in all the figures.

In the accompanying drawings, *a* represents a hollow artificial upper arm, which may be made of any suitable material, but which I prefer to make of wood, with the upper end thereof formed to receive the stump of the upper natural arm, and with a wing, *b*, extending in front of the shoulder. To the wing *b* a strap, *b'*, is secured, which passes over the shoulder of the amputated arm, across the back to and under the other arm, up in front, and there buckled or otherwise suitably secured at *c* to another strap, *d*, which is secured at *e* to the rear upper part of the artificial arm, and extends across the back to and over the shoulder of the other arm, the two straps *b'* and *d* crossing each other about the middle of the back, and being there attached to each other. In this way the upper artificial arm, for an upper amputation, is secured to the body and on the stump of the amputated arm without any strap passing over the breast, and so that it can be easily moved by the stump of the amputated arm; and by this I am enabled to avoid the use of a shoulder-plate extending over the shoulder, and which has been admitted to be objectionable. The lower arm, *e'*, made hollow, like the upper arm, is connected with the lower end of the upper arm by means of plates *f f*, connected by hinged joints at *g g* to constitute the elbow-joint, and as the upper arm at *h* (see Fig. 4) must be cut out to allow the lower arm to turn on its elbow-joint, (or, as the equivalent thereof, the lower arm must be cut out in like manner,) I provide the lower part of the upper arm with two curved spring-rods, *i i*, which hold out the covering of this part of the artificial arm, which covering is usually made of thin flexible leather, and when the lower arm is lifted and turned on its elbow-joint these spring-rods yield to permit the sides of the lower arm to pass between them; and in addition to the foregoing a cord, *j*, is attached at *k* to the lower part of the upper arm, and at *l* to the upper part of the lower arm, and about the middle of its length to a piece of wire, *m*, one end of which wire is secured to the upper arm, and the other looped around one of the spring-rods *i* (see Fig. 2) so as to slide thereon; or, as an equivalent, the said cord *j* may be attached intermediate its ends to any desired number of rods adapted to slide on both of the spring-rods *i i*. This cord *j* and spring-rods *i i* hold out the covering of the arm when put on, and also the sleeve of the coat, while at the same time they do not seriously impede the movements of the lower arm on its elbow-joint. The lower end of the lower arm is connected by a flute-joint with a wrist-piece, *n*, which can be turned thereon, and the two are connected and held together by two cords, *o o*, each attached inside the wrist-piece to a cross-rod, *p*, and each on one side thereof, and these cords pass along inside of the lower arm a short distance, and then pass through holes to the outside, where they are hitched to pins or hooks at *q q*, cavities being made for that purpose in the outer surface of the arm, so that no part of them or of the pins to which they are hitched shall project beyond the general outer surface of the arm.

By the means last above described the wrist-piece is held to the arm and may be readily turned thereon, and there held by the tension of the two cords *o o*, so that the hand can be set in any desired position. It will be obvious that the cords *o o* may be hitched or secured to the inside of the lower arm instead of outside. The lower end of the wrist-piece *n* is formed with a cavity in the form of the segment of a hollow cylinder extending entirely across it to receive the upper end of the hand *r*, which is of a form nearly the reverse to nearly fit it, so that the hand, when connected, can have a slight motion on the wrist-piece, and the two are connected by two thin plates of metal, *s s*,

which are secured to the inside of the hand and extend beyond the upper end thereof into the wrist-piece, and there the cross-rod *p*, before described, passes through holes made near their ends, thereby connecting the hand with the wrist-piece, so that the former can have a slight motion.

The forefinger *t* is jointed at the main knuckle to the hand by a rule-joint formed by simply cutting a scarf to receive the end of one of the metal plates *s*, which connect the hand with the wrist, and passing a fulcrum-pin, *u*, through a hole in both. The thumb *v* is also connected with the hand by a rule-joint and fulcrum-pin. A cord, *w*, branches into two, and is attached, one branch to the inside of the thumb at *x*, and the other to the inside of the forefinger at *y*. This cord extends up through the wrist-piece under a roller, *z*, inside of the lower arm, thence over another roller, *z'*, near the upper end of the lower arm, thence into the upper arm and around a roller, *a'*, mounted in a mortise in the upper arm not far from the lower end thereof, and thence along on the outside to the back of the wearer, where it branches, one branch being attached to the strap *d* at *c'*, and the other attached to a cross-strap, *d'*, extending diagonally from the strap *b'* to the strap *d*, the object of the double attachment being to prevent the coat or other garment from being forced outward by the cord when operating the arm. By reason of the foregoing arrangement, when the stump of the amputated arm is moved forward, tension is made on the cord *w*, and the first effect is to close the thumb and forefinger, and then to lift the forearm and hand, which can be thus readily lifted to the head, and by moving the stump back the tension is relieved, the arm and hand descend, and the thumb and forefinger are liberated.

For the purpose of opening the thumb and forefinger there is another cord, e^2, attached to the inside of the upper arm, and which passes into and through the lower arm and wrist-piece, and by a friction-roller, *f'*, in the hand, (see Fig. 4,) and beyond this roller the cord branches off, one branch passing to and being attached at *g'* to the outside of the thumb, and the other passing to and being attached at *h'* (see Fig. 2) to the outside of the forefinger. The upper end of the lower arm, a little above the axis of the elbow-joint, is formed with an inward projection, *i'*, over which the said cord e^2 passes.

It will be seen from the foregoing that when the stump of the arm is moved back, and the tension on the cord *w* thereby relieved, so that the forearm can descend, by so descending the weight of the arm will then make tension on the cord e^2, thereby opening the thumb and forefinger, and this is aided by the projection *i'* at the upper end of the forearm coming in contact with the said cord, thereby giving a considerable purchase or lever action to open the thumb and finger, so that a very light forearm and hand will have sufficient power to operate the parts.

When for any purpose it becomes desirable to hold the thumb and forefinger in a closed position, it is effected by a cord, *j'*, which is attached to the cord *w* in the hand, and which thence passes through the hand and through a hole to the outside of the wrist-piece, where it is formed with a loop or eye, which is secured to a hitch-pin, *k'*. (See Fig. 2.) By this means the person wearing such an artificial arm and hand can readily, with his natural hand, hitch this cord, and thus fix the thumb and forefinger in a closed position.

If desired, the thumb and forefinger can be made with all the knuckle-joints by extending the cords *w* and e^2 to and beyond the last of the series of knuckles. The other three fingers are formed of one piece, or of several pieces all connected to move together on the fulcrum-rod *u* of the forefinger, which extends through them and through a hole in both the plates *s s*, before described. These three fingers are formed to represent the fingers of a natural hand when in a partially-closed condition, as when carrying or grasping some object, and as they turn on the main knuckle-joint can be opened to a position represented by full lines, (see Fig. 3,) and they can be turned to the position represented by dotted lines, and there held by a cord, *l'*, attached to them on the inside and extending up through a hole to the outside of the wrist-piece, there to be secured to a hitch-pin, *m'*, in the same manner as above described for securing the thumb and forefinger in a closed position.

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

1. The arrangement of the straps for securing the artificial arm to the body and on the stump of the amputated arm without any strap passing across the chest, in combination with the wing of the upper artificial arm extending in front of the shoulder, substantially as and for the purpose specified.

2. The means herein described for holding out the covering of the open part of the artificial arm at the junction of the upper and lower arm, and in combination therewith, substantially as and for the purpose specified.

3. Connecting the turning wrist-piece with the forearm by a turning flute-joint, in combination with the two cords attached to the cross-bar in the wrist-piece and hitched to the forearm, and on opposite sides thereof, substantially as and for the purpose specified.

4. The cord which is attached to the upper arm and passes through the forearm and hand, and is attached to the thumb and forefinger to open the thumb and finger by simply depressing the hand, so as to bring the forearm in line or nearly in line with the upper arm, in combination with the cord to elevate the

forearm and close the thumb and finger by a forward movement of the stump of the natural arm, substantially as and for the purpose described.

5. In combination with the hinged fingers, the employment of a cord or cords attached to the fingers, and which can be hitched to a pin or its equivalent outside to hold the fingers in a partially-closed position, substantially as described.

THOMAS UREN.

Witnesses:
ANDREW DE LACY,
WM. H. BISHOP.