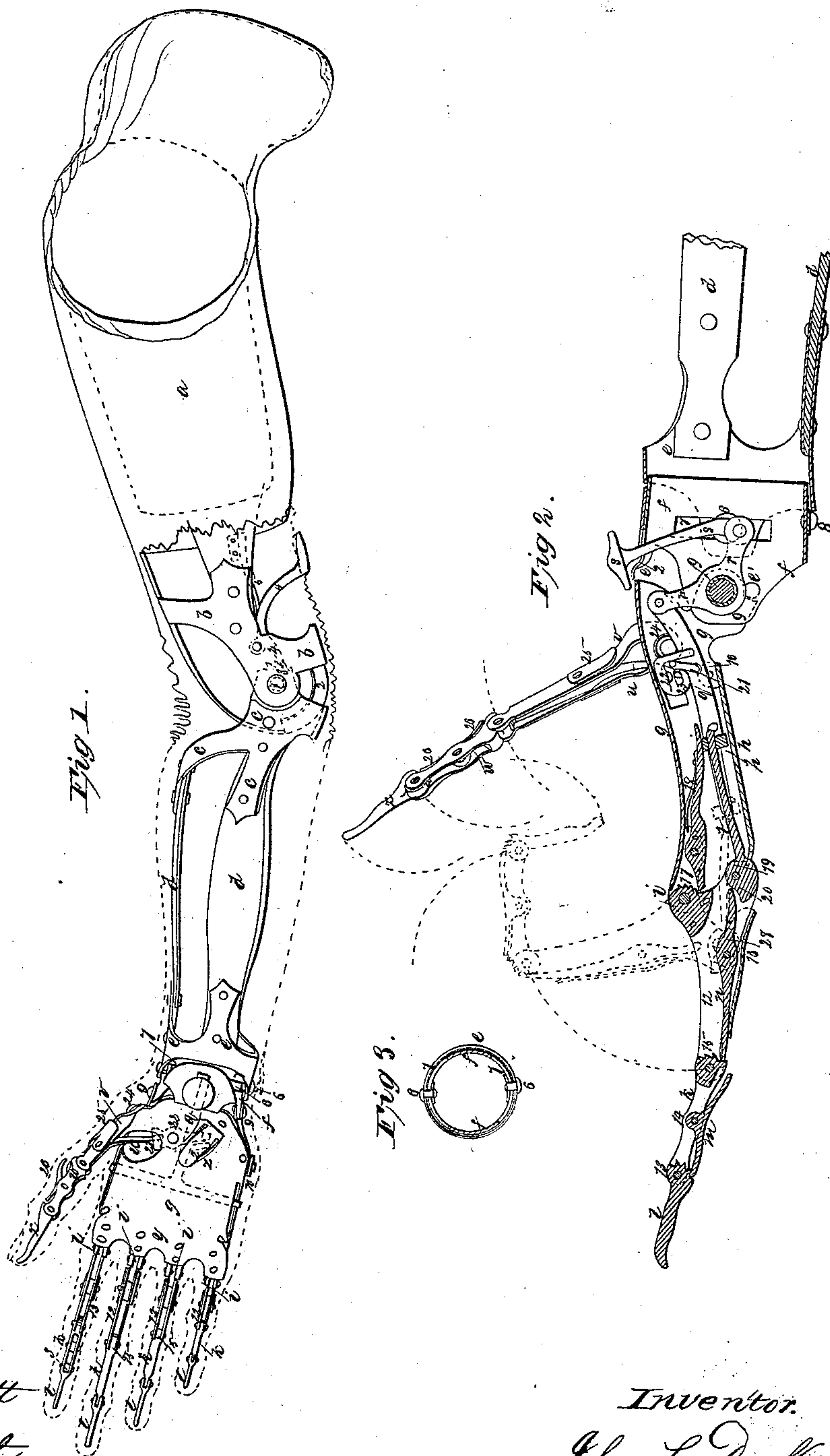


J. S. Drake,
Artificial Arm and Hand.
Patented July 22, 1856.

N^o 15,372.



Witnesses.
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ARTIFICIAL HAND AND ARM.

Specification of Letters Patent No. 15,372, dated July 22, 1856.

To all whom it may concern:

Be it known that I, JOHN S. DRAKE, of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented, made, and applied to use certain new and useful Improvements in Artificial Hands and Arms; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing, making part of this specification, wherein—

Figure 1, is a view of the hand and arm with its exterior covering removed to show the skeleton or metallic parts. Fig. 2, is a section through the hand, wrist, and one of the fingers, and Fig. 3, is a cross section at the wrist.

Similar marks of reference denote the same parts.

Artificial hands and arms have heretofore been constructed to set onto the stump of the lower or upper joint of the arm, and have been provided with springs and other attachments for causing the fingers and hand to grasp any substance placed within, but these are unhandy in use and do not accomplish near all the purposes required of a hand.

The nature of my invention consists in a peculiar construction of elbow whereby the position of the fore arm and stump can be varied, also in an open circular wrist which allows the hand to be turned to about the extent of a natural one; and the fingers and thumbs are so constructed and arranged in connection with parts in the hand, that by pulling out a small button or stop near the wrist, the hand is partially shut and the fingers and thumb can then be pressed down onto and retain any article that may be placed in the hand; or by simply forcing in the button aforesaid the fingers and thumb are liberated and can be distended in the natural form.

a is a socket to be formed of sole leather or suitable material, into the shape of the stump or arm to which the same is to be applied; this is to be padded and provided with straps as usual for attaching the same into place. *b, b*, are straps from said stump to the elbow joint 1.

2, is a curved guard against which the metallic straps *c*, of the fore arm move and

abut against straps *b*, when the arm is fully distended.

3, is a ratchet wheel on the part *c*, at the joint 1, with a pawl 4 and spring 5, which will hold the fore arm at any desired angle relatively with the stump and when the said fore arm is to be dropped so as to hang down the back of the pawl 4, is pressed on, disengaging it from the ratchet 3.

d, d, are whalebone frames or ribs extending from the straps *c*, to the straps *e*, of the wrist which wrist (*e*,) is formed circularly and receives within it the wrist piece *f*, that has mortises 7, 7, running part of the way around on opposite sides, and receiving rivets 6, in said mortises connecting said piece *f* to the straps *e*, and allowing said wrist to be turned a limited amount around the line of axis of the fore arm the extent of motion is determined by a rivet or stop.

9, 9, are joints on the wrist piece *f* connecting the piece *g* forming the palm of the hand, and the extent of motion is limited at the joints 9 by a rivet or stop at *e'*, taking a shoulder on the joint as seen by dotted lines in Fig. 2, and by the edge of the wrist piece *f* as at *e''*.

h, is the back piece of the hand, jointed at 10, and connected by a bolt at 11, thereby allowing access to the working parts of the hand.

i, i, i, i, are the knuckle joints connecting the first joints 12 of the fingers; *k*, second joints of fingers and *l*, are the third joints.

13, is a ratchet at the base of the third joint which may be used on only the fore or middle fingers or may be applied to all the fingers and thumb; and to this ratchet a pawl *m* is applied, the same being hung in the middle at 14, so that the one end can be pressed into and hold the ratchet and third joint of the finger in the desired position, or be disengaged therefrom on pressing in the other end; both these operations being performed by pressing on the outside covering of the hand by the other hand of the user.

n, is a pawl on a center 28, between sides 12, kept to a ratchet wheel 15 on the end of the second joint *k*, by a spring 16, and 17 is a ratchet wheel on the joint *i*, taking a pawl *o*, on the inner side of the plate *g*, and 18, is a spring to keep said pawl to the ratchet.

It will now be seen that each finger being thus constructed, one or all of them can be turned over toward the palm of the hand and pressed onto any article therein so as to hold the same firmly in consequence of the ratchets and pawls aforesaid, the manner therefore in which I disengage these pawls and straighten out the fingers when desired is as follows.

p is a cross bar sliding at its ends in slots in the edges of the hand (*g*) and from this a bar *q* passes to a bent crank *r* on the center pin of the joints *i* and *s* is a rod and button through a slot in the wrist which is acted upon by the other hand of the wearer of this arm, and if pulled out from the wrist forces up the cross bar *p* or vice versa.

t t t t are rods jointed at 19 to the knuckles and passing freely through the rod *p* and provided at this end with a head or bend to prevent pulling out of said bar *p*.

If now the button *s* be pulled out the cross bar *p* is driven up and overruns the wires or rods *t*, allowing them afterward to draw through as any one or more of the fingers may be turned down, and at this point the bar *p* stands opposite a depression in each of the pawls *o*, so that they act freely in holding the fingers; but if the button *s* be pressed in, the bar *p* is drawn down and taking the ends of the pawls *o* disengages them from the ratchets 17, allowing the rods *t* to pull the fingers back into a distended position, and as the first joints (12) become extended the cam heads 20 on the rods *t* taking the ends of the pawls *m* disengage the same from the ratchets 15 and allow the second joints *k* to be distended.

The thumb (*v*) is formed similarly to one of the fingers, and is attached by a rivet at 24 to the hand *g* so that it can have a little swaying motion (see dotted arc, Fig. 2). The second joint *w* is provided with a ratchet similar to the ratchet 15, and the third joint *x* has a ratchet (similar to 13) taking a pawl 26 the same as the pawl *m*.

u is a bar or pawl kept to the ratchet on the end of the joint *w* by the spring 25, the same as the pawl *u*, and in order to disengage this pawl *u* when the bar *p* is drawn down I make use of a pin 21 on the bar *q* (see also dotted lines, Fig. 1), acting on a lever 22, on the other end of which is an eye 23 taking loosely the end of the bar *u*, so that said end is carried toward the knuckles

as the button *s* is forced in and the upper end of said bar *u*, which forms a pawl is disengaged from its ratchet.

The covering which I make use of is to be composed of leather and india rubber, or of any suitable material, elastic at the elbow joint and at all other parts where required, and the hand should be of a separate piece from the covering of the arm so as to allow motion for the wrist; I propose that the said covering be formed in a peculiar manner of ground leather and india rubber, but as this becomes a separate invention the same may be the subject of another patent, suffice to say that the general outlines of the covering are indicated by dotted lines, Fig. 1.

z is a spring hook or clasp which may be attached to the palm of the hand near the wrist beneath which to slip a knife, fork or other tool in general use by the wearer.

What I claim and desire to secure by Letters Patent is—

1. The ratchet 3 and pawl 4 in the elbow joint to sustain the forearm at the proper position relatively with the stump substantially as specified.

2. I also claim the construction of the wrist joint (*f*) with the slots and stops for allowing the necessary motion substantially as specified.

3. I also claim forming the knuckle joints and joints between the different parts of the fingers and thumb with ratchets and pawls so as to secure said joints at the point to which they may be moved in adjusting the fingers or thumb to any given article or purpose substantially as specified.

4. I also claim disengaging the pawls *u* and *o* from their respective ratchets by means of the sliding cross bar *p* (actuated by competent power) rods *t* and cam pieces 20 substantially as specified.

5. And I also claim the arrangement of the bars *p* and *q*, crank *r*, button and rod *s* for actuating the bar *p* and rods *t* substantially as specified, and in connection with this arrangement I also claim the cross lever 22 for actuating the bar and pawl *u* of the thumb substantially as specified.

In witness whereof I have hereunto set my signature this nineteenth day of June, 1856.

JOHN S. DRAKE.

Witnesses:

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