

H. A. Kimball,

Artificial Hand.

N^o 39,578.

Patented Aug. 18, 1863.

Fig. 1.

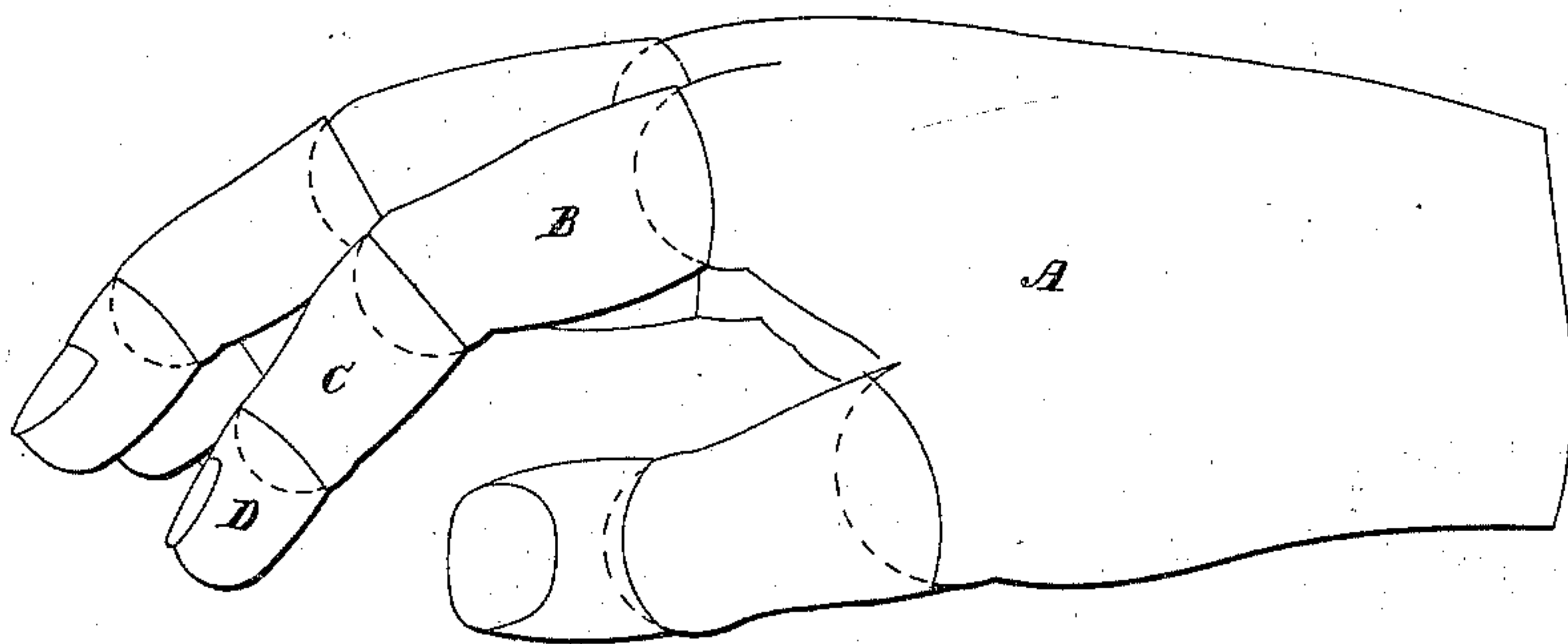


Fig. 2.

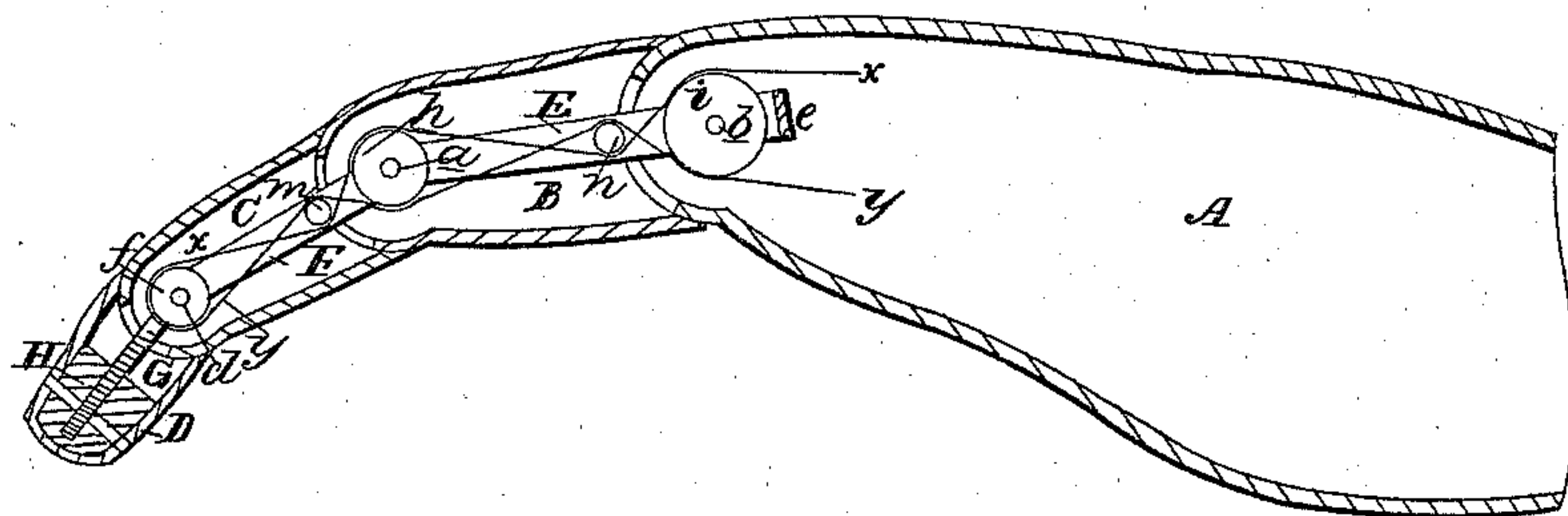
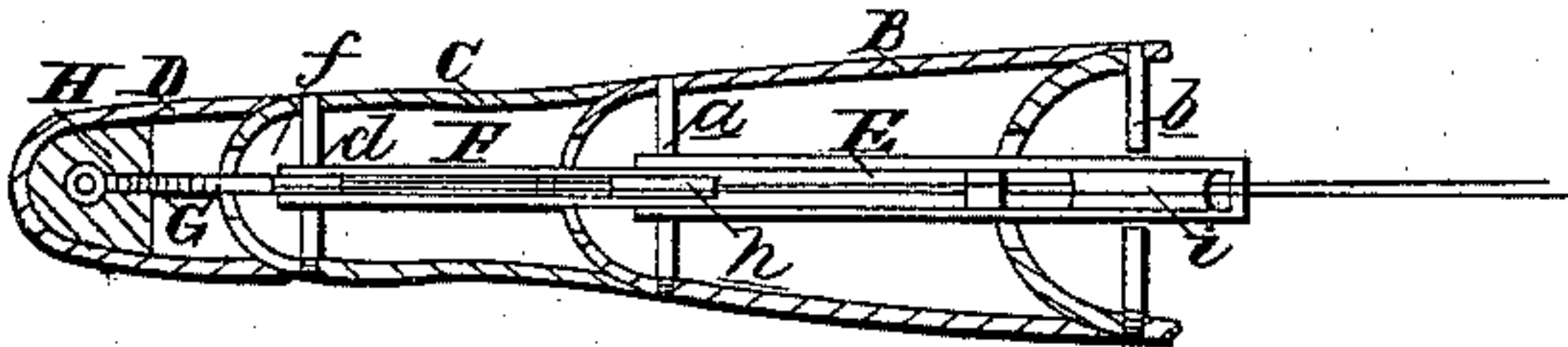


Fig. 3.



Fig. 4.



Witnesses:
Charles E. Foster
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UNITED STATES PATENT OFFICE.

HIRAM A. KIMBALL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN ARTIFICIAL LIMBS.

Specification forming part of Letters Patent No. 39,578, dated August 18, 1863.

To all whom it may concern:

Be it known that I, HIRAM A. KIMBALL, of Philadelphia, Pennsylvania, have invented an Improvement in the Manufacture of 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 of an artificial limb having members made of vulcanized gum cast in molds, and in imitation of the exterior form of the natural limb, as described hereinafter, the object of my invention being to obtain sufficient room within the members of the limb to introduce strong and elaborate works, and at the same time to obtain that strength and durability in which ordinary artificial limbs are deficient.

In order to enable others skilled in the art to make my invention, I will now proceed to describe the manner of carrying it into effect.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is an exterior view of an artificial hand made in accordance with my improvement; Fig. 2, a longitudinal section through one of the fingers and body of the hand; Fig. 3, a detached view of the works contained in one of the fingers, and Fig. 4 an edge view of Fig. 3.

Similar letters refer to similar parts throughout the several views.

All the parts of the hand are made of vulcanized gum by forming the latter, while in a plastic state, in molds. For instance, a mold of appropriate form will be required for the body A of the hand, another for the first member, B, of the finger, a third for the second member, a fourth for the last member, and so on for every member of the hand. While the gum is in the mold it is subjected to the usual vulcanizing process, and thereby hardened.

Artificial hands have been heretofore made of light wood, the use of which involves the following objections: First, the natural weakness of the material and the limited dimensions to which it is necessary to reduce the wood in order to obtain the desired shape of the different members precludes the possibility of hollowing out the latter for the purpose of introducing appropriate works for operating the members, hence it becomes

necessary to expose portions, at least, of the works, which render the hand unsightly; secondly, a wooden hand, however strongly it may be made, is liable to injury and breakage, owing to the tender nature of the material; thirdly, the wood is of such a nature that when the hand becomes wet it swells, and the whole of the parts become so disarranged that it is a most difficult and almost impossible task to readjust them. By the use of vulcanizable gum in the construction of the hand these defects are obviated, for the gum can be made so thin and yet so strong that the most substantial works can be arranged within the members and be wholly concealed from view; at the same time the material is of such an imperishable and unchangeable nature that the hand may be subjected to moisture without fear of injury, and is capable of resisting that harsh treatment which the brittle and tender nature of wood does not permit.

It will be observed, on reference to Fig. 2, that the first member, B, of the finger is connected to the body of the hand by the usual ball-and-socket joint, the second member, C, being connected to the first by a similar joint, and the third member to the second member by a like joint. Two steel bars, E, connected together at the end *e*, are introduced as a means of connecting the first member, B, of the finger to the body of the hand, a steel pin, *a*, passing through the bars and being screwed into the vulcanized gum, as seen in Fig. 4, and this pin is the center of the ball-and-socket joint which connects the first and second members of the finger together. In like manner a steel pin, *b*, passes through the bars E and through the vulcanized gum of the body A of the hand, this pin being the center of the joint which connects the first member, B, to the body of the hand. Two steel bars, F, are jointed to the pin *a*, a pin, *d*, passing through these bars and being secured to the material of the second member, C, and forming the center of the joint which connects the second member to the last member, D, a rod, G, being jointed to the pin *d*, and this rod being connected to the last member, D, by securing it to a block, H, of soft gum-elastic deposited within the end of the finger. A string, *x*, secured to the pulley *f*, which forms a part of the rod G, passes under a small pulley, *m*, over the pulley *h*, under a pulley, *n*, and over

the pulley *i*, while another cord, *y*, secured to the same pulley, *f*, passes over the pulley *m*, under the pulley *h*, over the pulley *n*, and under the pulley *i*, the strings being connected to devices which it is unnecessary to describe. On pulling the string *y* the three members of the finger will turn simultaneously on their ball-and-socket joints, so as to close the finger, and the pulling of the string *x* will have the contrary effect of stretching the finger out.

The above-described parts will serve to illustrate the extent, elaborate character, and strength of the mechanism which can be introduced into one of the fingers only of the hand. I do not, however, desire to confine myself to the peculiar mechanism described,

nor to the manufacture of artificial hands only, as my invention is applicable to the construction of other limbs; but

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

As a new article of manufacture, an artificial limb having its members made of vulcanized gum cast in molds and in imitation of the exterior form of the natural limb, as set forth, for the purpose specified.

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

HIRAM A. KIMBALL.

Witnesses:

HENRY HOWSON,
JOHN WHITE.