

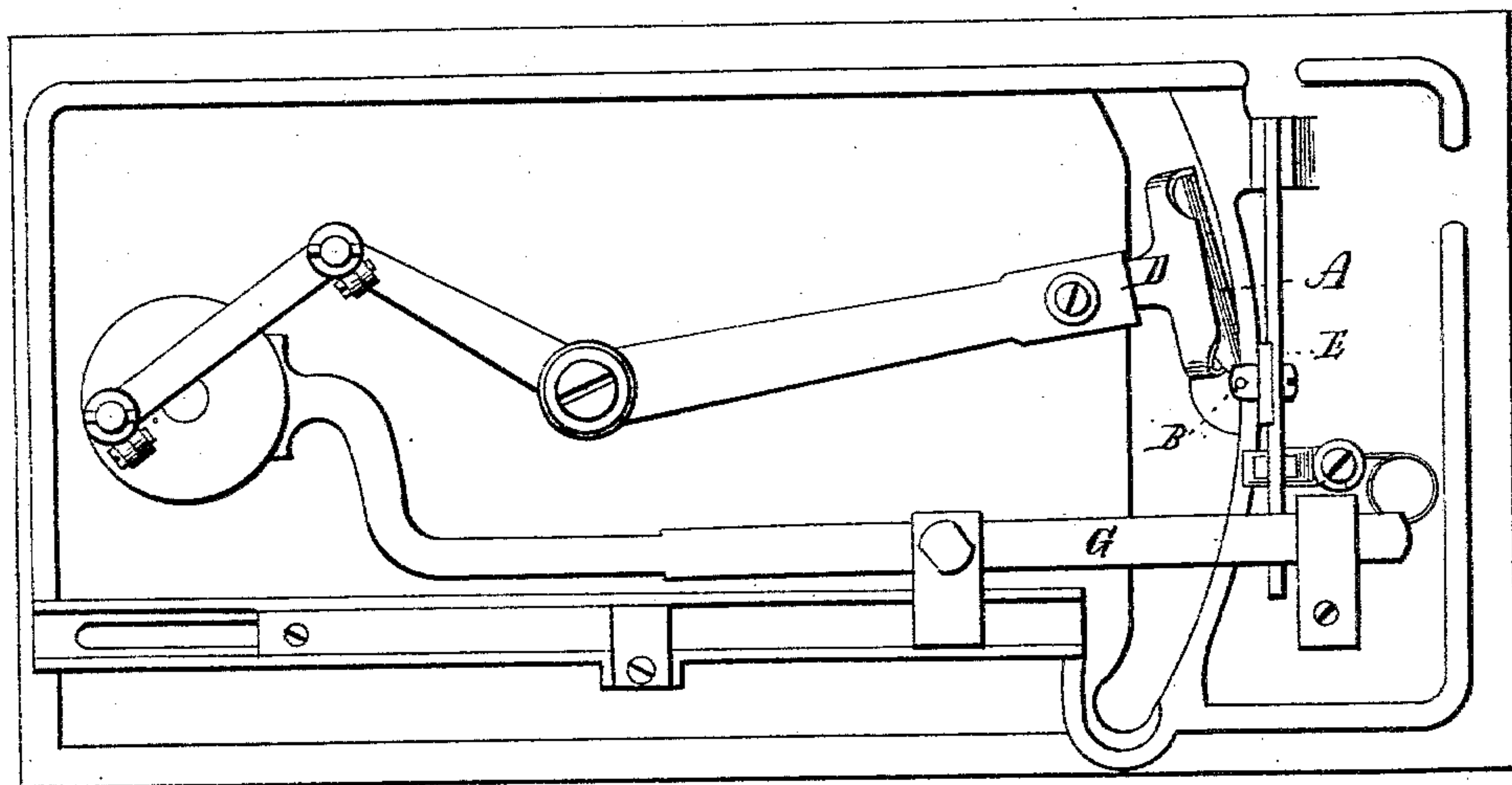
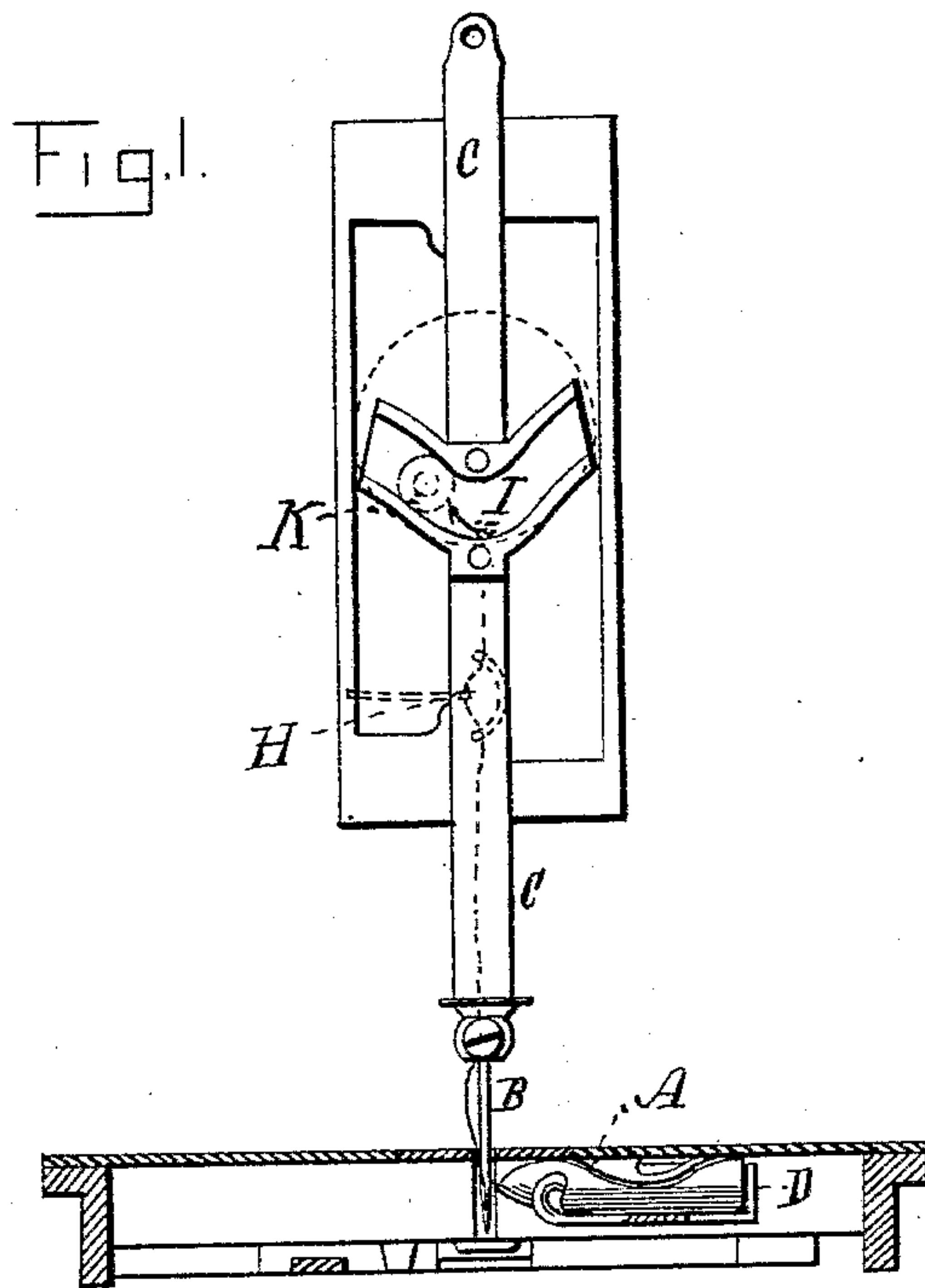
(No Model.)

2 Sheets—Sheet 1.

E. S. CRAM.
SEWING MACHINE.

No. 315,914.

Patented Apr. 14, 1885.



WITNESSES
J. A. Clark.
A. S. Brown.

INVENTOR,
Elisha S. Cram,
By his attorney,
A. S. Brown.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

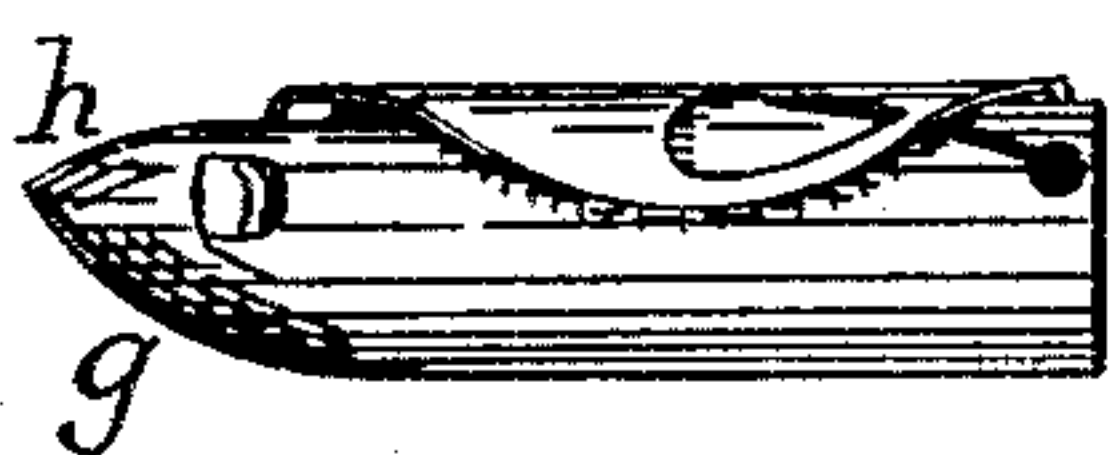


Fig. 4.



Fig. 5.

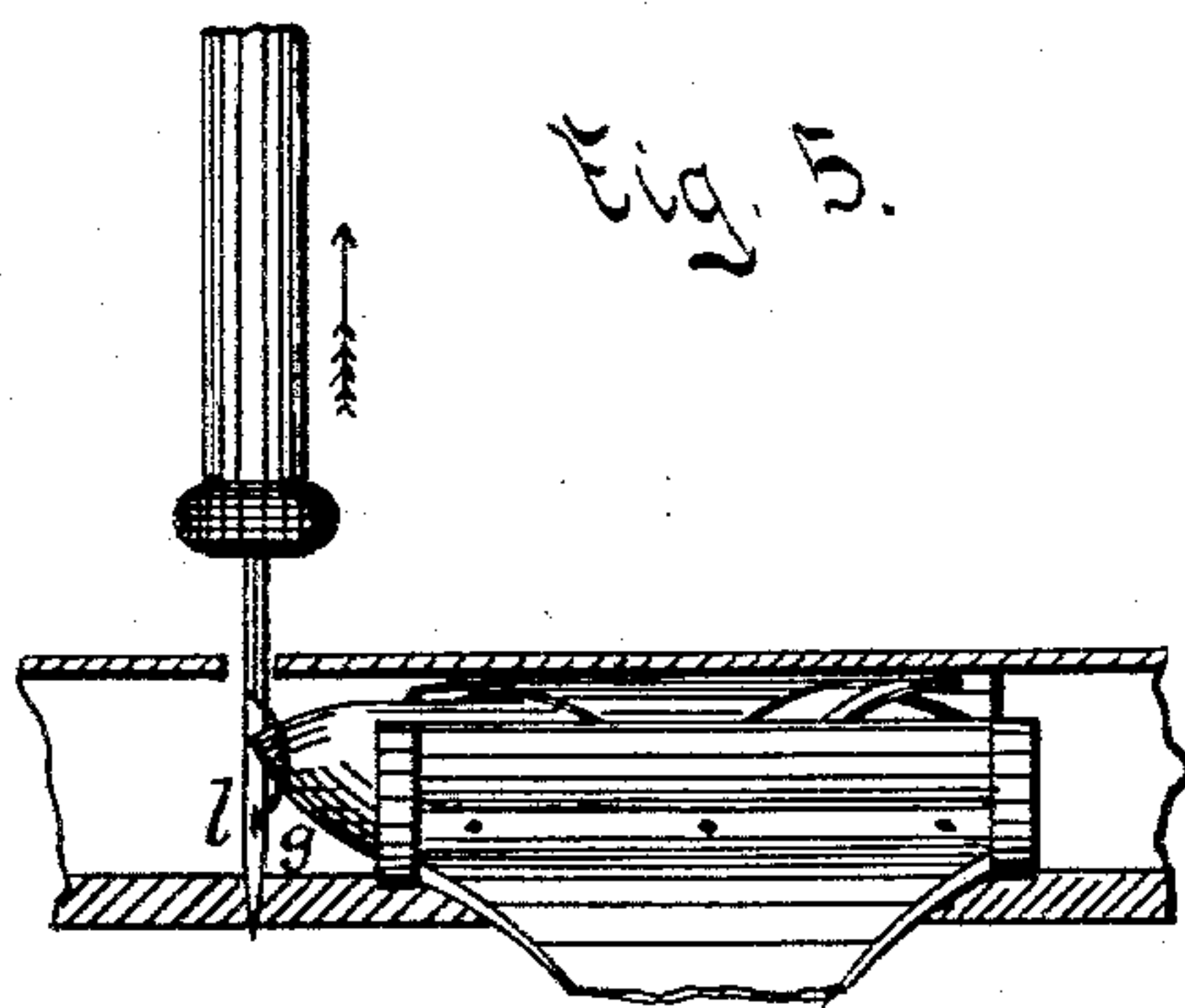
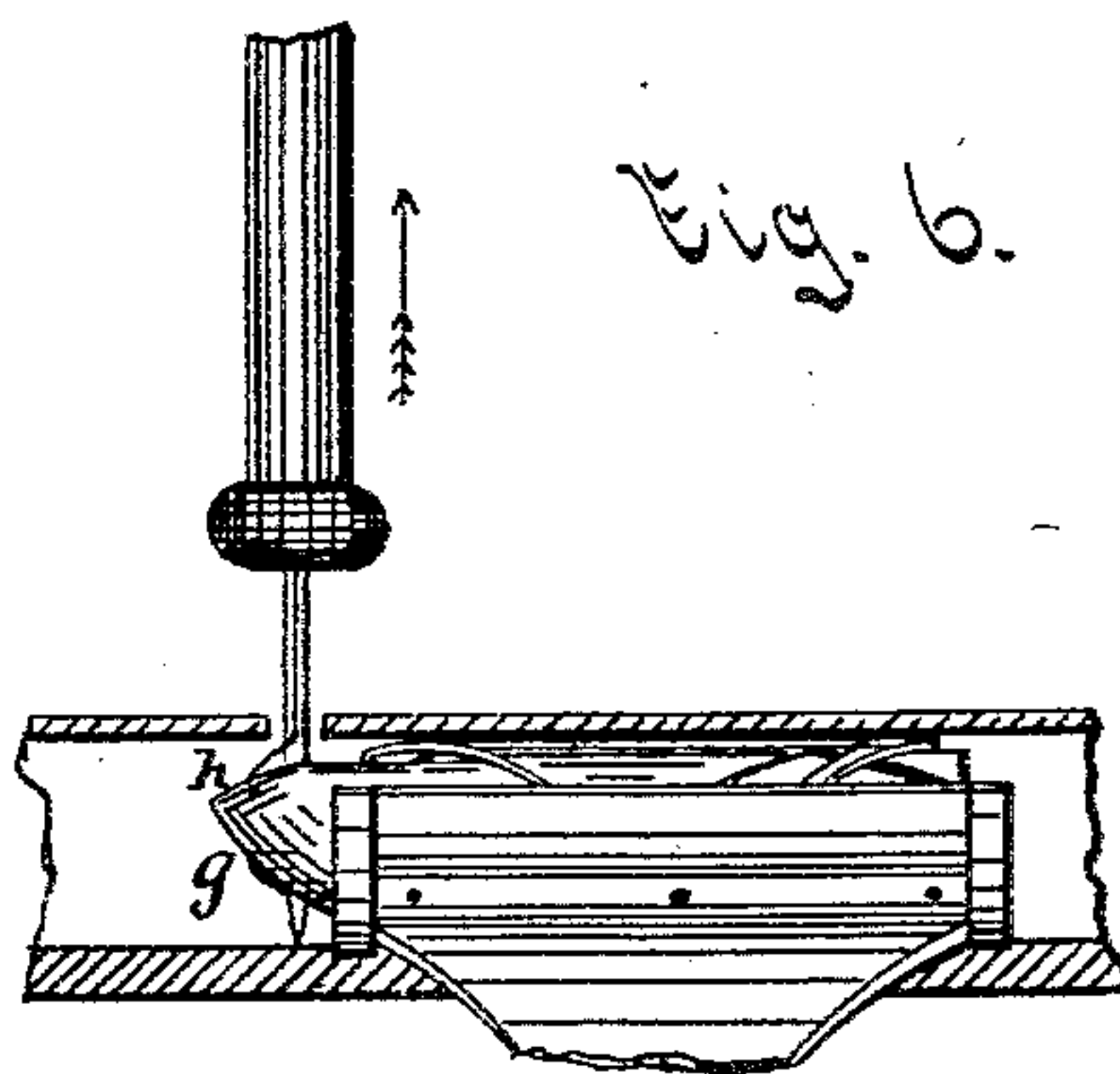


Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

ELISHA S. CRAM, OF LACONIA, NEW HAMPSHIRE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 315,914, dated April 14, 1885.

Application filed January 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, ELISHA S. CRAM, of Laconia, in the county of Belknap and State of New Hampshire, have invented an Improvement in Sewing-Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The special purpose of my invention is to adapt sewing-machines, as well those already in use as those hereafter to be manufactured, to the employment of a method of fastening the threads at the ends of seams in machine-sewing, invented by me and made the subject-matter of a separate application for Letters Patent filed May 9, 1884, Serial No. 130,902, the same consisting, in general terms, in first sewing forward in the usual way, then reversing the motion of the machine and feeding backward to the extent of a few stitches without forming stitches, and then sewing forward again as far as fed back, the second set of stitches being formed in the same needle-holes in the fabric as the first set of stitches.

The above-mentioned method can only be employed with a shuttle sewing-machine that will feed the cloth backward and the shuttle of which will not take stitches while feeding back.

No sewing-machine known to me with any shuttle heretofore in use will feed backward without breaking the needle-thread, and consequently without an improved construction of the sewing-machine or shuttle my method of fastening seams cannot be employed.

I have ascertained that the cause of the threads breaking with the ordinary shuttle when the motion is reversed is that the point or forward end of the shuttle is too long and sharp, so that it enters the thread-loop when the needle is rising, and by retaining the loop compels the ascending needle to break the thread. The cause of this is the construction of the cam and cam-pin, or their equivalent, by which the needle-bar is raised or lowered, the cam being so constructed as to raise the needle-bar more quickly in the reverse motion of the machine than in the forward motion, in the latter case the raising of the needle-bar being purposely retarded to allow time for the shuttle to fully enter the needle-thread loop,

but afterward being hastened more rapidly than would be otherwise necessary, as in the case of the reversal of the sewing-machine's motion. By repeated trials and experiments I have discovered and determined a form of shuttle which will cast aside the thread-loop when the feed is reversed, and therefore not enter the same, so that the needle does not break the thread, but draws the loop completely out of the cloth.

In the accompanying drawings, Figure 1 represents a transverse vertical section of a shuttle sewing-machine through the head thereof, showing my improvement applied thereto, the positions of the parts being shown as when the motion of the machine is reversed, the needle has commenced to rise, and the shuttle brought forward to the needle; Fig. 2, a view of the under side of the machine, the parts being in a position corresponding to the parts in Fig. 1; Fig. 3, a side view of the shuttle in its improved form for this invention; Fig. 4, a top view of the same; Fig. 5, a transverse vertical section of parts of the machine, showing the shuttle as brought forward to the needle-thread loop in the reverse motion of the machine; Fig. 6, a view corresponding to the view in Fig. 5, but showing the needle partially raised and the shuttle still farther advanced—far enough to cast aside the needle-thread loop, as required.

Like letters designate corresponding parts in all of the figures.

The point of the shuttle is much shorter forward of the shuttle-carrier and more obtuse than usual, and yet it takes the thread-loops without fail when the sewing-machine is working normally. The shortening of the ordinary shuttle required to effect the purpose is one-fourth of an inch, or thereabout, forward of the shuttle-carrier, the remainder of the shuttle not affecting the time of taking the thread-loop of the needle; and in using the term "shortened in the part forward of the shuttle-carrier," as applied to the shuttle, I intend it to be understood that such a shortening of the shuttle to substantially the extent here set forth, so as to effect the purpose herein specified, is meant. The form shown will indicate the proper construction; but I am enabled to state practically the limits of the form which will always effect the purpose, and I believe

it to be the best that can be adopted. The lower side, *g*, of the shuttle-point, especially, should be as obtuse as practicable, because it is this surface mostly which strikes and casts off the thread-loop. It should be more obtuse than an angle of forty-five degrees from the axial line of the shuttle. The best angle I believe to be between thirty-five and forty degrees from a line in a vertical plane at right angles to the axis of the shuttle. The top angle, *h*, may be sharper—say between fifty-five and sixty degrees from the right-angled line. The outer side, *i*, should be nearly as obtuse as the lower side—say between thirty-eight and forty-four degrees from the right-angled line—and slightly curved convexly, as shown. Figs. 5 and 6 indicate two positions of the shuttle in relation to the needle and thread while feeding backward. While the shuttle is passing the needle the latter is rising. The point of the shuttle reaches the needle, as shown in Fig. 5, when the eye *l* of the needle is a little below the point which first enters the loop slightly, as shown; but its obtuseness, together with the slight upward motion of the needle, causes the shuttle to first move the loop forward, and finally cast it to one side back of the shuttle, which then passes in front of it, as shown in Fig. 6.

In addition to the main purpose effected by this construction of the shuttle, it also prevents the breaking of the thread when the machine is accidentally turned backward, or by the ignorance of persons inexperienced in sewing.

The drawings show the main parts of the sewing-machine co-operating with the shuttle A, namely: B represents the needle; C, the needle-bar; D, the shuttle-carrier; E, the feed-bar; G, the feed-lever; H, the take-up; I, the cam by which the needle-bar and needle are raised and lowered in connection with the cam-pin K, shown by dotted lines in Fig. 1 as operating in that end of the cam by which the needle-bar is raised in the reverse motion of the machine. It will be seen that this end of the cam is lower than the other end of the cam, whereby the needle-bar is raised more quickly than when the machine is running forward.

What I claim as my invention is—

In combination with the shuttle-carrier, needle, and needle-bar of a sewing-machine, and with means—such as the cam I and cam-pin K—for actuating the needle-bar thereof, wherein the needle-bar is raised more quickly in the reverse motion than in the direct motion of the machine, a shuttle shortened in the part forward of the shuttle-carrier to the extent and formed at the point substantially as set forth, whereby it is adapted to cast off and pass outside of the needle-thread loop in the reverse motion of the machine, for the purposes herein specified.

In testimony whereof I have signed my name in presence of two witnesses.

ELISHA S. CRAM.

Witnesses:

EDGAR C. COVELL,
E. F. BURLEIGH.