

(No Model.)

2 Sheets—Sheet 1.

L. E. SALISBURY.
KNITTING MACHINE.

No. 528,810.

Patented Nov. 6, 1894.

Fig. 1.

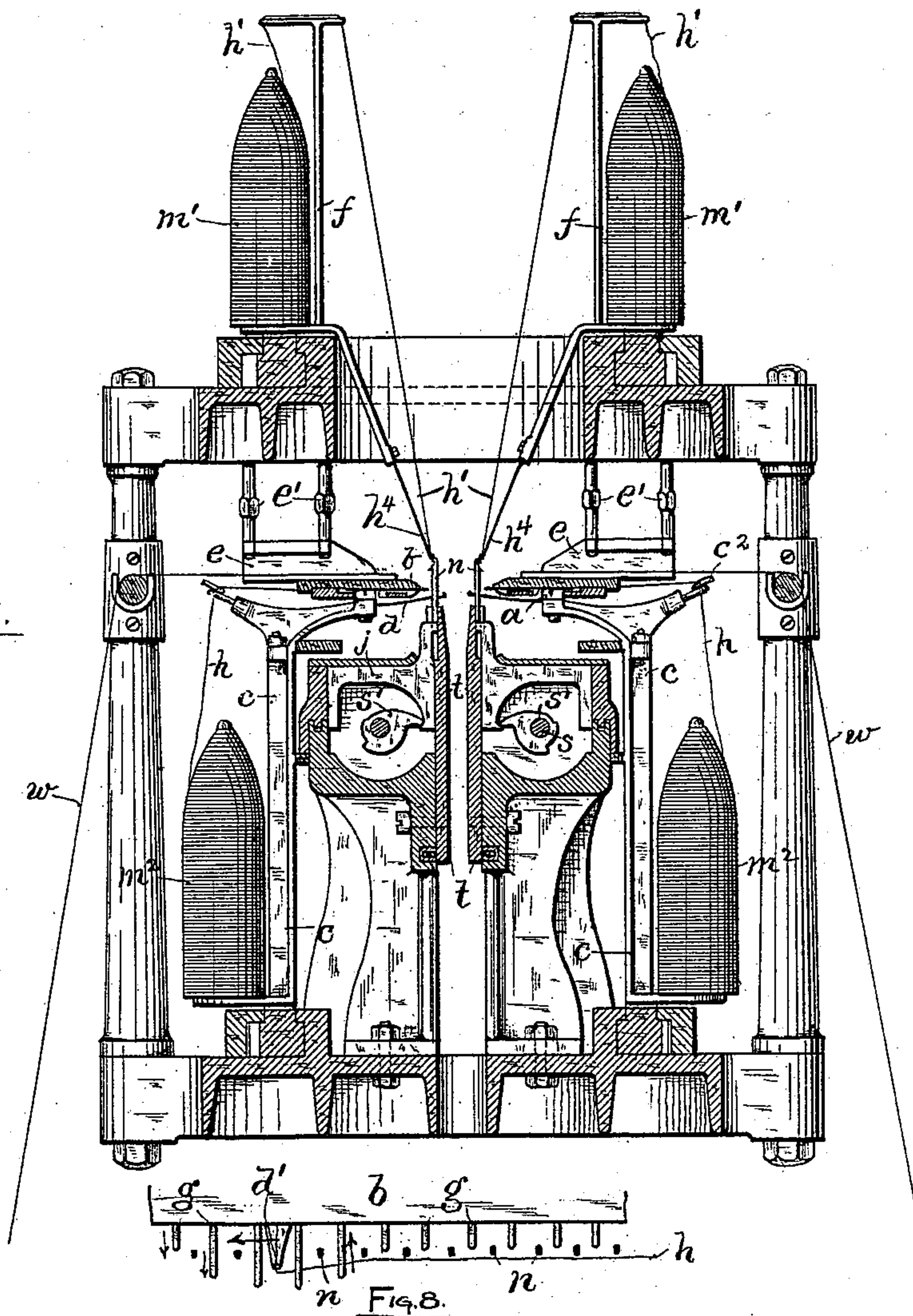


Fig. 8.

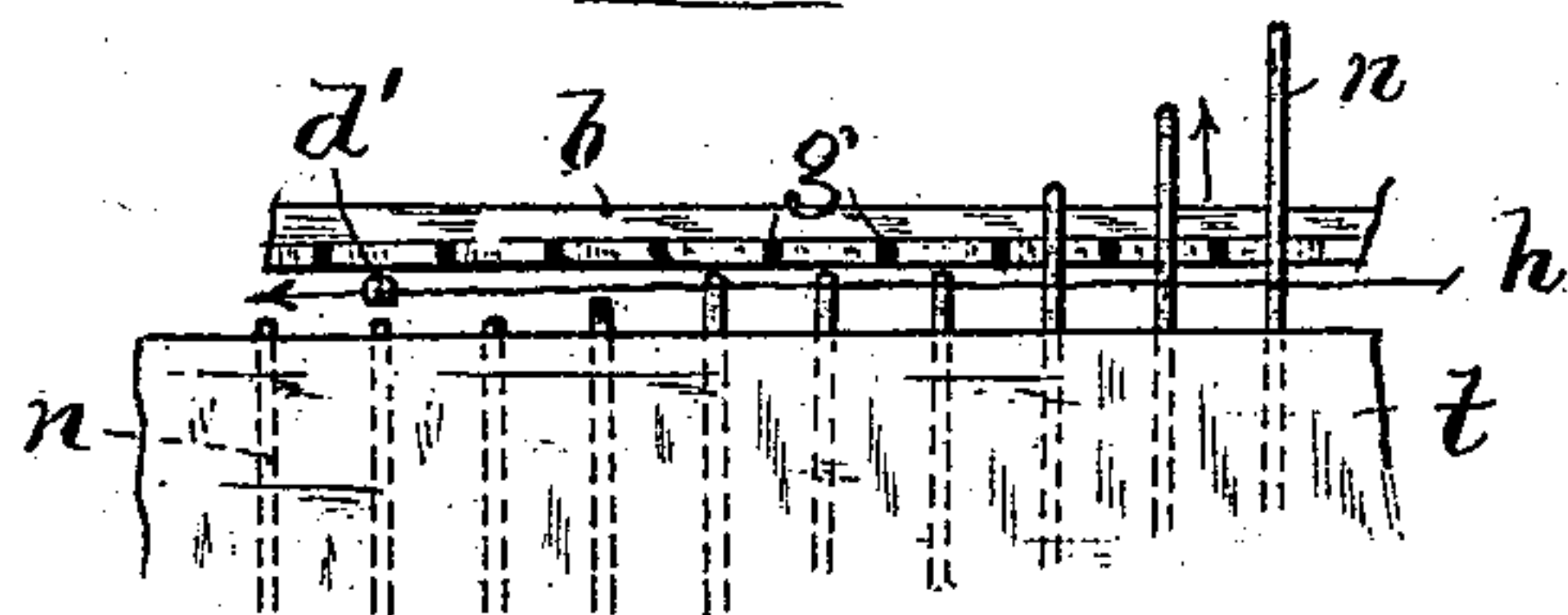


Fig. 7.

WITNESSES.

Charles W. Boardman.

Fred Arnold.

INVENTOR.

LEVI E. SALISBURY.

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Attys.

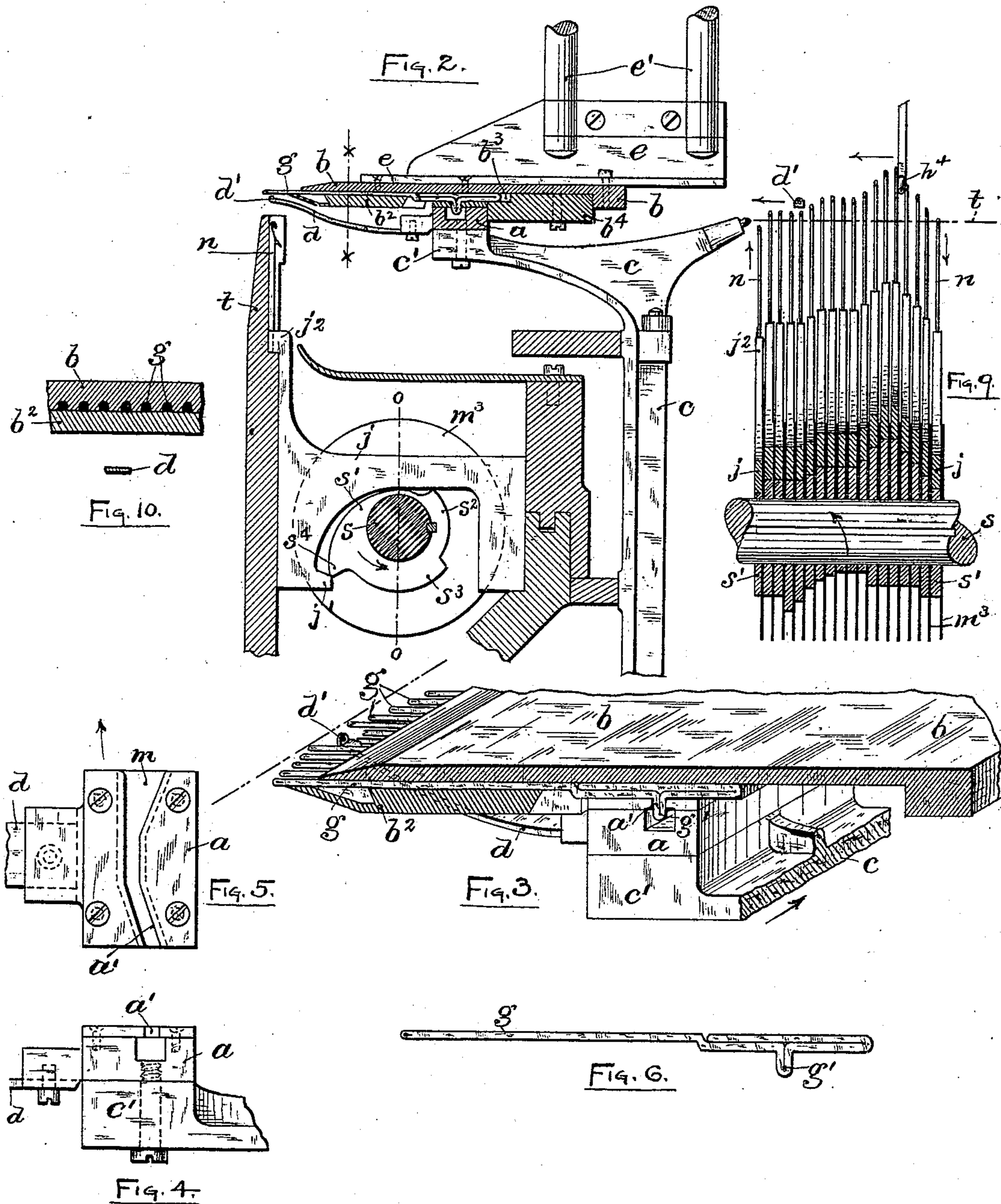
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Charles W. Boardman.
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UNITED STATES PATENT OFFICE.

LEVI E. SALISBURY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO HENRY
A. CHURCH, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,810, dated November 6, 1894.

Application filed December 22, 1893. Serial No. 494,407. (No model.)

To all whom it may concern:

Be it known that I, LEVI E. SALISBURY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In a patent of the United States, issued to me July 7, 1891, No. 455,464, I have described and claimed certain improvements in knitting machines, the needles thereof being arranged and mounted in adjustable straight bars, the whole forming what may be termed a "straight" knitting machine. In said machine the fabric produced is composed of a series of warp-threads, a series of upper knitting-threads interlocking with each other and with the warp-threads, and a series of lower straight filling threads alternating with the said upper threads and laid continuously along one side of the warp-threads. The said patented machine is provided with a series of fixed U-shaped warp-guides made of sheet steel and fastened to a stationary plate, the outer or free ends of the guides passing between and beyond the back side of the needles; or in other words, the guides extend just far enough back of the needles to prevent the filling-thread guide from coming in contact with the warp-threads as it travels along. By reason of such construction the needles descend and draw the knitting-yarn down to make the stitch, at the same time drawing the yarn over the end of the warp-guides. An objection to said construction is that it is liable to produce imperfect work by cutting the knitting-threads at weak places by reason of its contact with the warp-guides. Another object is that when a needle is not perfectly straight it is apt to strike the guide in rising, the result being to either bend or break the needle or the guide itself.

In order to overcome the objections just referred to I have devised the improvement

forming the subject of my present application for Letters Patent, the same consisting essentially of movable warp-guides arranged to be successively actuated in sections or series, whereby they are thrust outwardly so as to hold the warps away from the filling-guide as the latter travels along, and are then drawn back so as to avoid contact with the rising needles; the said warp-guides remaining in the rearward position until after the descending needles have formed the corresponding portion of the knitting-thread into loops or stitches, all as will be more fully hereinafter set forth and claimed.

In the accompanying two sheets of drawings, Figure 1 is a vertical sectional view, taken transversely through the upper portion of a knitting machine provided with my improvement. Fig. 2 is an enlarged transverse sectional view, showing portions of the needle-bar, frame, warp-guide mechanism, &c. Fig. 3 is a perspective view of the warp-guide holders, supporting plate and actuating cam. Fig. 4 is an end view of said cam. Fig. 5 is a plan view of the cam. Fig. 6 is a side view of one of the warp-guides. Fig. 7 is a side elevation showing a portion of the needle-bar and the adjacent part of the warp-guide holder, &c. Fig. 8 is a plan view of the same. Fig. 9 is a vertical sectional view, taken on line o o of Fig. 2, showing the arrangement of one group or series of needle-actuating cams, and Fig. 10 is an enlarged sectional view, taken on line x x of Fig. 2, showing a portion of the grooved plate, &c., containing the warp-guides.

My present invention, as before stated, relates to improvements adapted more especially to be employed in the knitting machine patented to me July 7, 1891, No. 455,464, the improvement residing essentially in so mounting and actuating the several warp-guides that they operate both to hold the warps away from the traveling filling-guide and also to prevent them from engaging the needles when the latter rise beyond the plane of the warp-guides.

As the improvement is substantially to mechanism for actuating the warp-guides I have not deemed it essential herewith to illustrate and describe the machine as a whole.

Therefore the following specification sets forth the warp-guide mechanism and its correlated parts. I would state, however, that the machine as patented is provided with oppositely mounted needle-bars, and a pair of revolving shafts on which are mounted groups or series of spirally-arranged cams, each cam actuating a cam-frame, the latter carrying at its upper end a knitting needle adapted to be moved up and down in a corresponding slot or groove formed in the front side of the needle-bar. The machine is also provided with a series of continuously traveling bobbins carrying the filling-threads, similarly mounted and traveling bobbins carrying the knitting threads, the filling threads being laid in advance of the knitting-threads, and warp-threads passing to and alternating with the needles through the medium of fixed U-shaped guides.

In the drawings herewith t, t' designate the two needle-bars mounted in suitable framing; s , the cam-shafts; s' , the cams; j , the cam-frames, and n the needles secured to the cam-frames adapted to work vertically in the needle-bars. The filling or weft-threads h are mounted on bobbins m^2 , which in turn are mounted on vertical holders or carriers c , a similar arrangement of carriers f and bobbins m' , located at the top of the machine, being employed for carrying the knitting-threads h' , as shown in Fig. 1. The several knitting-threads are conducted downwardly to the needles by suitable guide-tubes h^4 traveling with the carriers f .

The carriers c are provided at the upper ends with means for automatically changing the relation of the warp-threads w and their guides g with respect to the needles, the same practically forming the present invention. By referring to Sheet 2 of the drawings it will be seen that the top of the carrier is enlarged to form a head or table c' on top of which is secured a cam-block a ; the latter having an irregular or cam-shaped groove a' adapted to receive the shanks g' of the warp-guides g . These latter, instead of being stationary as in my patented machine before referred to, are mounted to move endwise in grooves formed in the under side of the stationary supporting plate b which in turn is secured to pieces e attached to studs e' tapped into and depending from the under side of the upper bed of the machine. (See Fig. 1.) The warp-guides alternate with the needles mounted in the bars t , and are arranged at substantially right angles therewith; the retracted or normal position of the warp-guides being indicated in Fig. 8 at the right. To the rear or farther side of each cam-block is secured a bent guide d whose free end is provided with an eye d' arranged to receive and carry a filling-thread h ; the said eye portion extending beyond the line of the backs of the needles and adapted to travel ahead, or longitudinally of the machine, in the space formed between the under-side of the warp-guides and

the tops of the needles, when the latter are in the normal or lowest position. (See Figs. 2 and 7.)

In the present needle-actuating cams s' I have represented them as having the center or hub portion provided with two concentric stops or projections s^2, s^3 , each extending circumferentially about ninety degrees. By means of this construction each cam, after dropping its needle to the lowest point, or just below the top of the needle-bar t , in rotating immediately acts upon the needle-frame to lift the needle to a point flush with the under side of the warp-guides through the medium of the projection s^2 followed by further elevating the needle by the second projection s^3 , after which the toe s^4 completes the vertical movement of the needle; the latter remaining stationary until the said cam-toe engages the lug j' of the frame and depresses the latter to its lowest position, or as represented in Fig. 2, thus making one complete revolution. Fig. 9 shows a group or series of cams and needles corresponding to one knitting-thread and one filling-thread. The cams are arranged spirally upon the shafts, and are separated by fixed washers or disks m^3 . The horizontal line at the top indicates the upper edge of the needle-bar t ; d' indicating the corresponding relation of the traveling filling-thread guide, and h^4 the traveling knitting-thread guide, the said group of needles, &c., being continuously repeated throughout the length of the needle-bar.

The guide-plate, b , is as before stated grooved on its under side to freely receive the warp-guides g , a bottom cap or strip b^2 being dove-tailed into the plate to prevent the guides from falling out, as shown in Figs. 2, 3 and 10. To the front lower side of the plate b is secured a piece b^4 , the same serving both as a guide or support for the upper portion of the carriers c and a stop b^3 for the guides g . (See Fig. 2.) Said stop is formed by cutting away the top of the piece b^4 , thus producing a shoulder to prevent the guides from being retracted too far. By this arrangement the shanks g' of the guides will successively enter the mouth m (Fig. 5) of the traveling cam for the purpose of thrusting out the warp-guides.

From the foregoing it will be seen that the mechanism is adapted and arranged whereby the warp-guides are successively thrust outwardly to their limit, by cam a , just in advance of the filling-guide traveling along below them, and at substantially the same instant that the step s^2 of the revolving cams s' lifts the corresponding needles slightly above the needle-bar, thereby laying the filling-threads under the warp-threads and back of the needles and upon the previously formed knitting-thread loops or stitches upon the needles. The moving cam a next retracts the guides g to the normal position thus carrying the warp across the filling-threads, followed by introducing the knitting-threads which are

at once converted into loops or stitches and interlocked with the previously placed warps and filling-threads.

I claim as new and desire to secure by Letters Patent—

1. In a knitting machine, the combination with vertically arranged mechanically actuated needles, of a knitting-thread guide h^4 traveling longitudinally of the machine and contiguous to the upper end of the needles, a filling-thread guide d' located in advance of said guide h^4 and traveling in concert therewith above the needles, a series of warp-guides g located above said filling-thread guide, arranged at substantially right angles with and alternating with the needles, and means for projecting the outer or free ends of the warp-guides from the front to the back of the needles in advance of the traveling guide d' and retracting them after it has passed, substantially as described.

2. In a knitting machine of the class described, the combination with a stationary plate b , mechanically actuated needles and independently movable warp-guides mounted in said plate and arranged at substantially right angles to the needles, of a continuously traveling filling-thread holder and guide mounted below the warp-guides, a traveling knitting-thread guide h^4 and mechanism, substantially as described, for intermittently actuating the warp-guides endwise.

3. In a knitting machine, mechanically actuated needles a suitably mounted stationary plate, as b , warp-guides, as g , loosely mounted in the under side of said plate and provided

with depending shanks, in combination with a continuously traveling cam, as a , arranged to successively engage said shanks to actuate the guides endwise, a filling-thread guide and a knitting-thread guide traveling in concert with said cam, substantially as described and for the purpose set forth.

4. In a knitting machine, the combination, with a continuously traveling knitting-thread holder and guide, a similarly traveling filling-thread holder and guide, and warp-guides and means for intermittently actuating said warp-guides at right angles to the needles, of a stationary needle-bar, movable needles mounted in said bar and revolving needle-actuating cams, as s' , arranged in continuous series, each cam having steps, as s^2, s^3, s^4 , increasing in height formed on its forward or advancing side, substantially as described and for the purpose set forth.

5. In a knitting machine employing a plurality of threads, the combination of suitably mounted mechanically actuated needles, independently movable warp-guides arranged with respect to the needles, mechanism for successively projecting and retracting said guides endwise, and mechanisms for feeding the threads and knitting them together to produce a fabric, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

LEVI E. SALISBURY.

Witnesses:

GEO. H. REMINGTON,
CHARLES W. BOARDMAN.