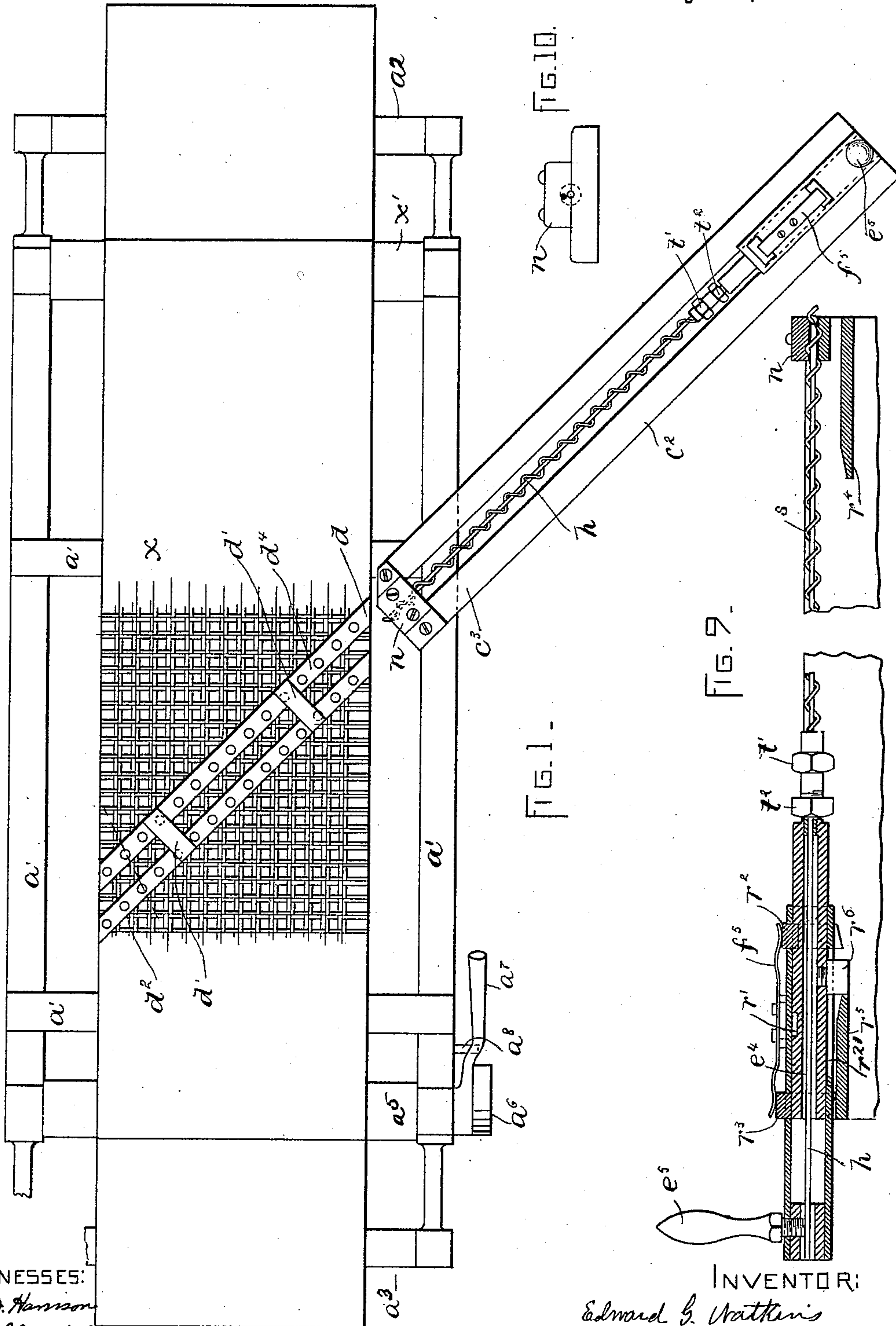


3 Sheets—Sheet 1.

No. 539,601.

Patented May 21, 1895.



WITNESSES:  
A. D. Harrison  
Robert Abell.

INVENTOR:  
Edward G. Wetheris  
by Wright Brown & Quinby  
Atty. &

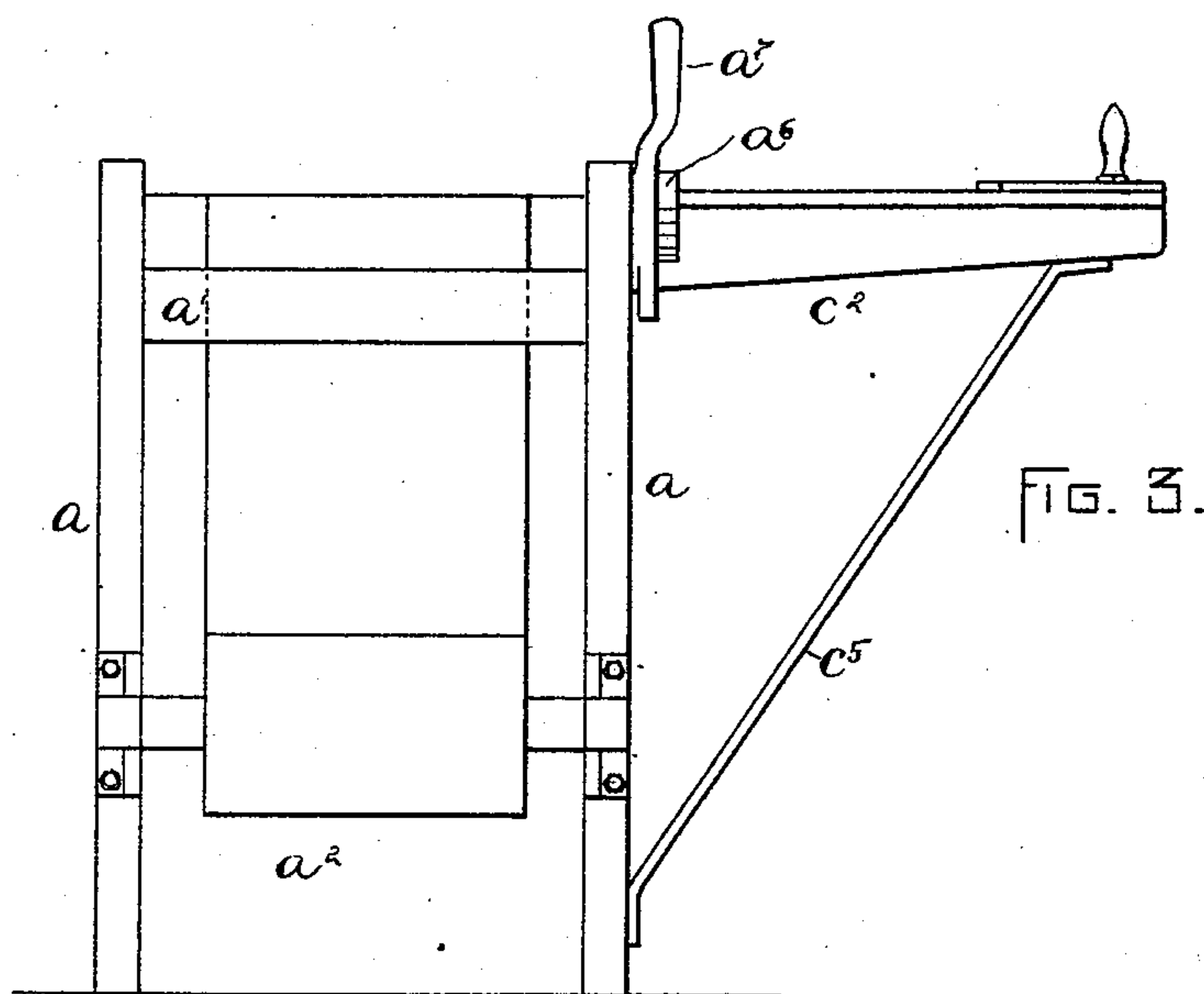
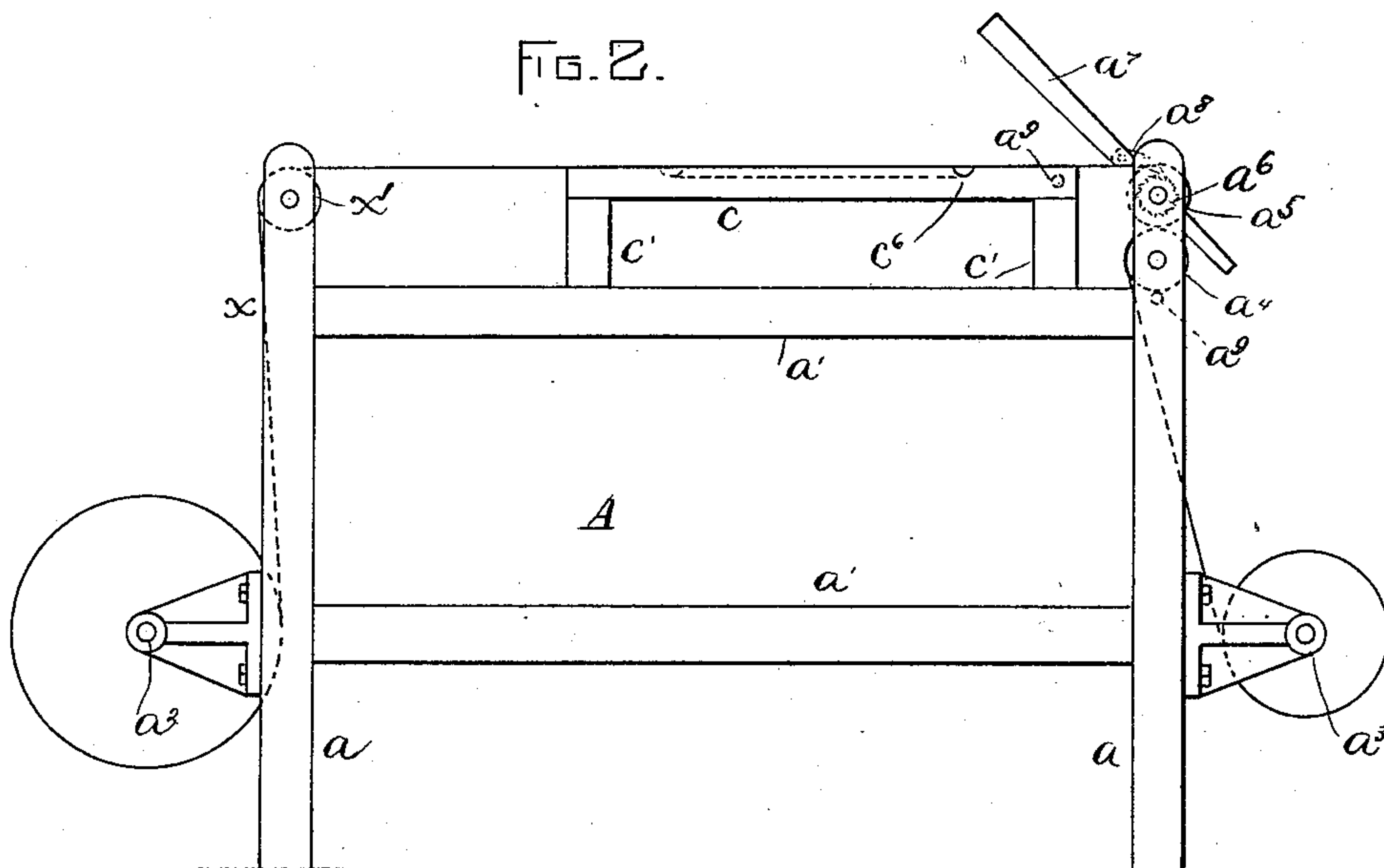
(No Model.)

3 Sheets—Sheet 2.

E. G. WATKINS.  
LOOM FOR WEAVING CANE SEATING.

No. 539,601.

Patented May 21, 1895.



WITNESSES:

A D Harrison  
Rollin Abell.

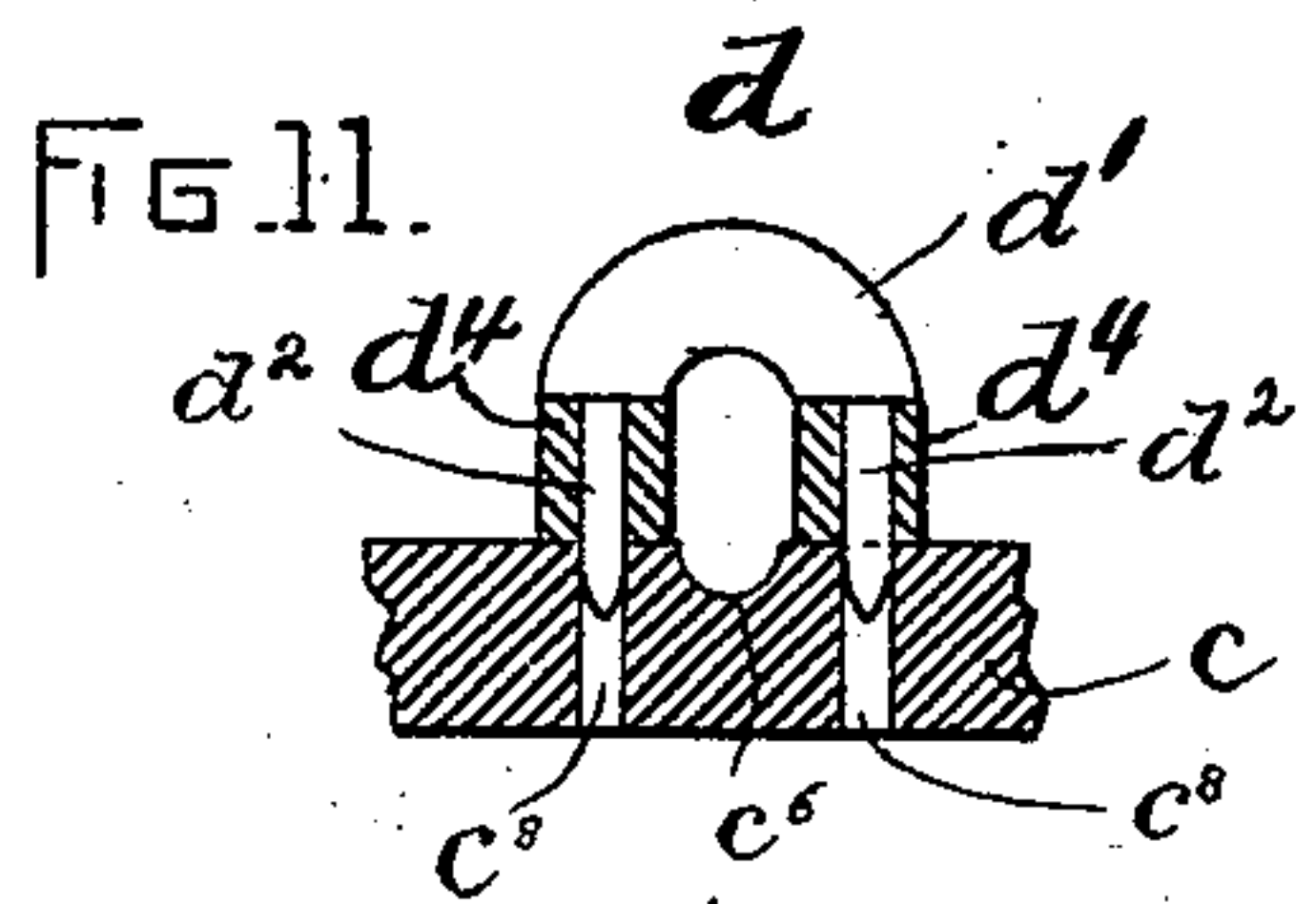
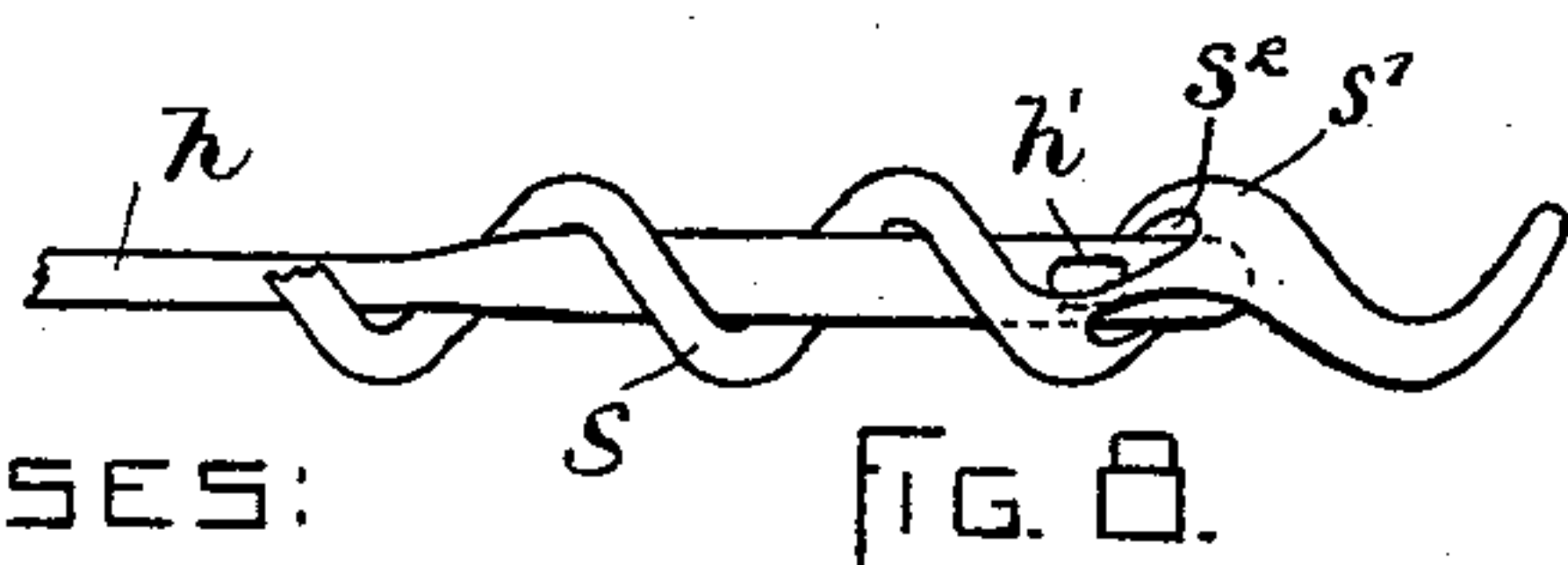
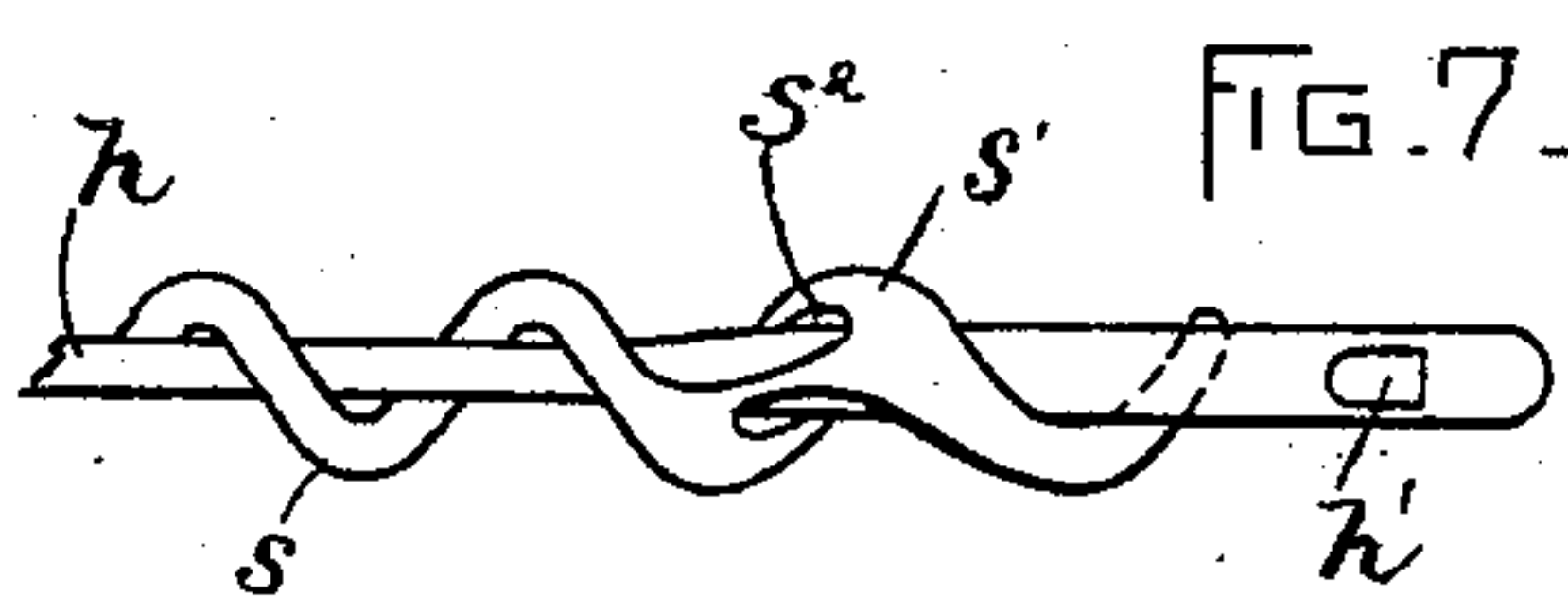
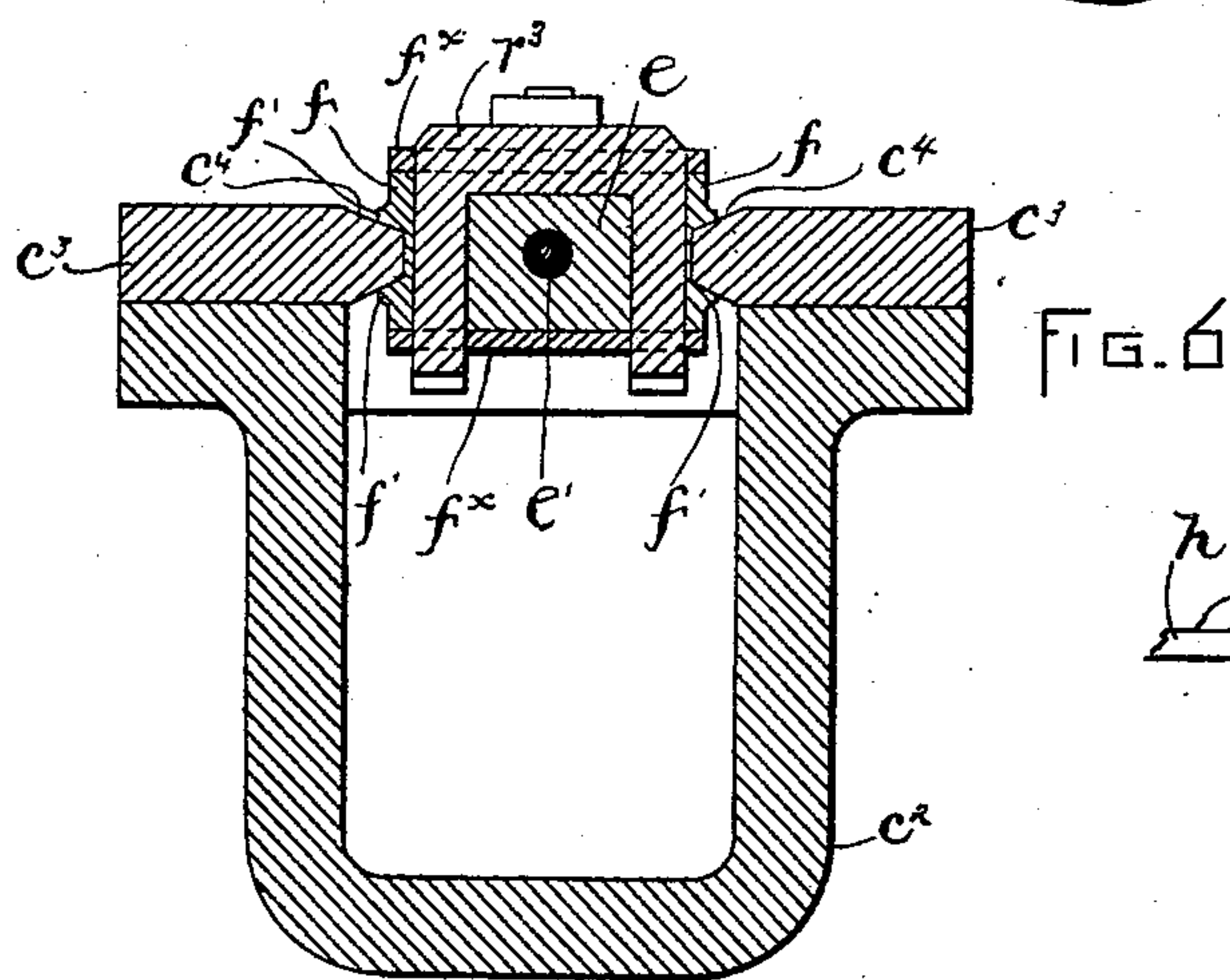
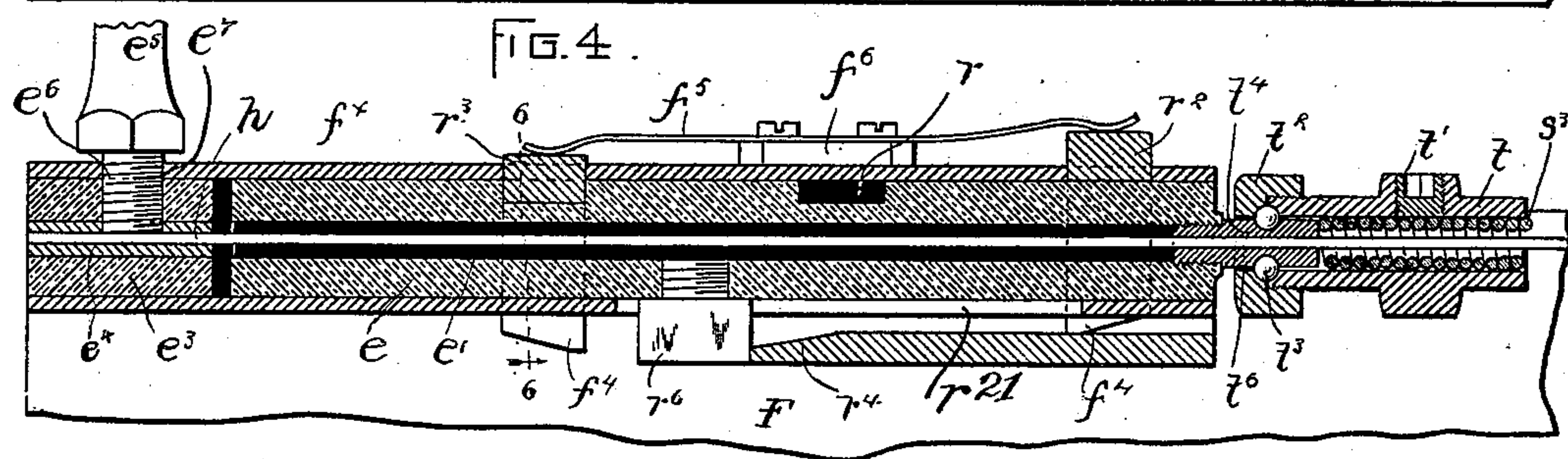
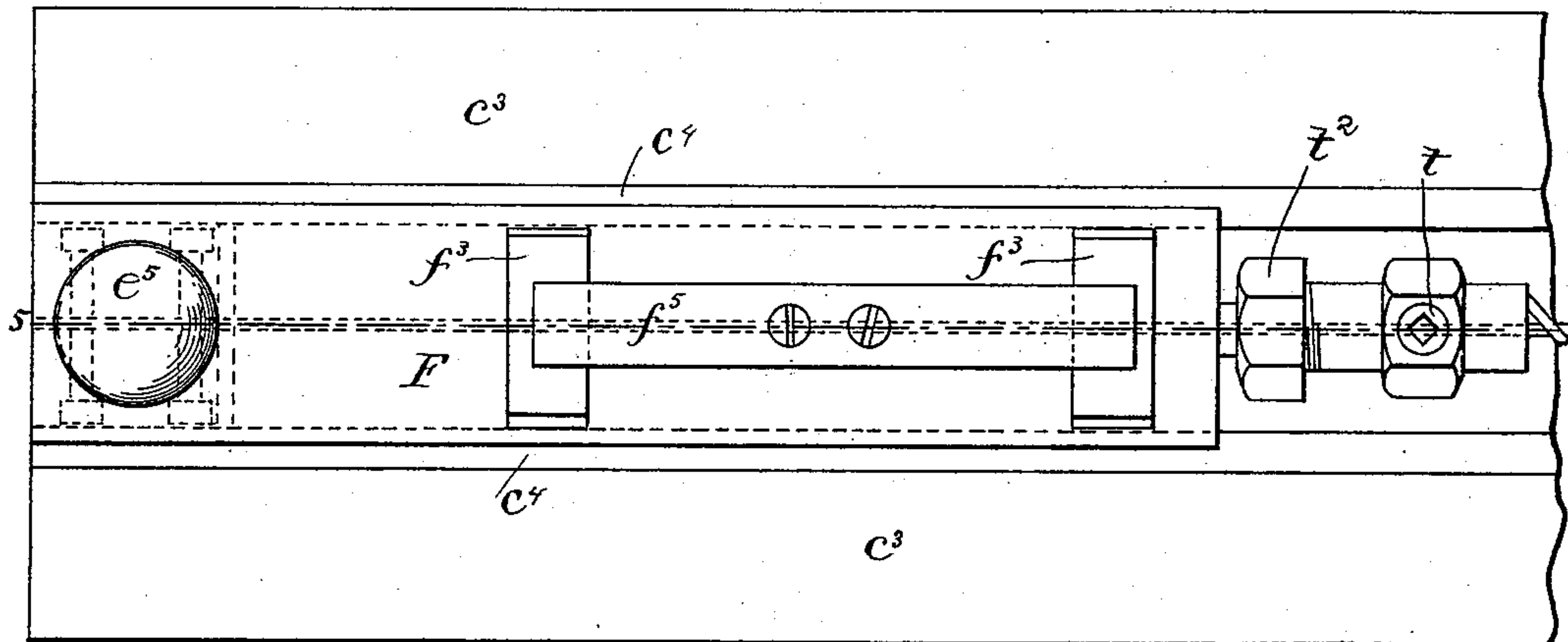
INVENTOR.

Edward G. Watkins  
by Wright, Brown & Lumb  
Atty's.

E. G. WATKINS.  
LOOM FOR WEAVING CANE SEATING.

No. 539,601.

Patented May 21, 1895.



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Attys.



# UNITED STATES PATENT OFFICE.

EDWARD G. WATKINS, OF GARDNER, MASSACHUSETTS, ASSIGNOR TO  
HEYWOOD BROS. & CO., OF SAME PLACE.

## LOOM FOR WEAVING CANE SEATING.

SPECIFICATION forming part of Letters Patent No. 539,601, dated May 21, 1895.

Application filed January 5, 1895. Serial No. 533,899. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD G. WATKINS of Gardner, in the county of Worcester and State of Massachusetts, have invented certain  
5 new and useful Improvements in Looms for Weaving Cane Seating, of which the following is a specification.

This invention relates to an improvement in looms for weaving the diagonal strand into  
10 the cane seating fabric used for chairs, and consists in the novel features of construction and relative arrangement of parts hereinafter fully described in the specification, clearly illustrated in the drawings and particularly  
15 pointed out in the claims.

Reference is to be had to the accompanying three sheets of drawings, forming a part of this application, in which like characters indicate like parts wherever they occur.

20 Figure 1 is a top plan view of a loom embodying my invention. Fig. 2 is a side elevation of the loom shown in Fig. 1. Fig. 3 is an end elevation thereof. Fig. 4 is a top plan view of the raceway, showing the strand-carrier and shed-forming mechanism. Fig. 5 is a section on the line 5 5 of Fig. 4. Fig. 6 is a vertical cross-sectional view, enlarged, on the line 6 6 of Fig. 5. Figs. 7 and 8 are detail  
25 views of the shed-former and strand-carrier in its two different positions—that is, unsheathed in Fig. 7 and sheathed in Fig. 8. Fig. 9 is a side elevation of the raceway, reciprocating head, and its associated parts. Fig. 10 is a detail view of the nut by which rotary  
30 motion is imparted to the shed-former. Fig. 11 is an end elevation of a portion of the table *c* and the guide *d*, showing the guide in position.

In the manufacture of cane seating, after  
40 the fabric has been woven, the ordinary warp and weft are at right angles to each other, the weft and warp being spaced apart to form small squares. Then the diagonal strand stock is introduced into the fabric in order to  
45 strengthen it and to make the small openings through the fabric more nearly in the form of a circle. This has been done previous to my invention, either by running the diagonal strand through by a needle held in the hand,  
50 or by machines having clamps for forcing the fabric apart to form a shed. Both of these

expedients are objectionable, the former by reason of the time required and the latter by reason of the complication of the mechanism employed and the slowness of the work. 55

My improved loom A for inserting this diagonal strand has a suitable frame work consisting of uprights (*a*) and cross-pieces (*a'*). These may be of any desired construction or arrangement. A supply-roll (*a*<sup>2</sup>) and  
60 a take-up roll (*a*<sup>3</sup>) are secured in suitable bearings attached to opposite ends of the loom. The fabric (*x*) passes up over a roll (*x'*) mounted at the top of the uprights (*a*) to which the supply-roll (*a*<sup>2</sup>) is secured; thence  
65 the fabric passes in a horizontal line over a table (*c*) supported upon uprights (*c'*) resting on cross-pieces (*a'*), then over a roll (*a*<sup>5</sup>), journaled in the uprights (*a*) to which the take-up roll (*a*<sup>3</sup>) is secured, and between the  
70 roll (*a*<sup>5</sup>) and a roll (*a*<sup>4</sup>) journaled in said uprights immediately below the roll (*a*<sup>5</sup>); thence to the take-up roll (*a*<sup>3</sup>). The shaft of the roll (*a*<sup>5</sup>) is provided with a ratchet-wheel (*a*<sup>6</sup>). A handle (*a*<sup>7</sup>) is mounted loosely on this shaft  
75 provided with a pawl (*a*<sup>8</sup>) arranged to engage the ratchet-teeth on the wheel (*a*<sup>6</sup>) and thus impart motion to the roll (*a*<sup>5</sup>), whence by means of the pressure between the rolls (*a*<sup>4</sup>) and (*a*<sup>5</sup>) the fabric is drawn along over the  
80 table (*c*) from the supply-roll to the take-up roll. Stops (*a*<sup>9</sup>) are arranged to engage the ends of the handle (*a*<sup>7</sup>) to limit its movement, the amount of movement being the distance from one diagonal strand to another. 85

The features so far described may be varied indefinitely, I having shown them as a convenient arrangement, but many modifications will at once suggest themselves to any one skilled in the art. 90

Projecting from and secured to one side of the framework is a raceway (*c*<sup>2</sup>) the outer end of which is supported by means of a brace (*c*<sup>5</sup>) secured to the end of said raceway and to one of the uprights (*a*) of the loom frame. 95  
Upon the top of this raceway are supported two guides (*c*<sup>3</sup>) having beveled edges (*c*<sup>4</sup>) projecting into the raceway. Upon the end of the raceway that is secured to the loom is attached a nut (*n*) provided with interior screw-threads having a pitch corresponding to the pitch of the turns in the shed-former to be 100



hereinafter described. Mounted in this raceway is a reciprocating head (F). This consists of a shell having grooves to engage the beveled edges of the guides and having on its interior a reciprocating bar. This shell is made up of side-pieces (f) having projecting flanges (f') to engage the beveled edges of the guides. These side-pieces (f) are secured in any convenient way to top and bottom plates (f<sup>x</sup>). Mounted in the shell is a reciprocating bar (e) having a central longitudinal aperture (e') and provided on its top sides with slots (r) (r') arranged to be engaged by U-shaped latches (r<sup>2</sup>) (r<sup>3</sup>) straddling this bar and extending down between the bar and the side-pieces (f). When in their normal position in these slots, the latches lock the bar and shell together. But one of these latches is in its slot at a time so that when the latch in the slot is raised, as hereinafter described, the shell may be slid along over the bar. A leaf-spring (f<sup>5</sup>) secured to a block (f<sup>6</sup>) on the top plate (f<sup>x</sup>) has its ends bearing respectively upon these latches (r<sup>2</sup>) (r<sup>3</sup>) in order to retain them in their normal position until acted upon by the inclines (r<sup>4</sup>) (r<sup>5</sup>), respectively at the inner and outer ends of the raceway. The lower ends of these latches (r<sup>2</sup>) (r<sup>3</sup>) are beveled as at (f<sup>4</sup>) in opposite directions, as shown in Fig. 5. The beveled ends of these latches are arranged to engage the inclines (r<sup>4</sup>) (r<sup>5</sup>) and raise the latch while a stud (r<sup>6</sup>) projecting from the bar (e) through a slot r<sup>21</sup> in the lower plate (f<sup>x</sup>) between said latches is arranged to strike against the inclines and act as a stop for the bar, permitting the shell to slide upon said bar. Thus it will be seen that these latches alternately act to release the shell from the bar while the stud (r<sup>6</sup>) stops the bar and permits the shell to be slid upon the bar. Supposing the head to be moved to the right see Fig. 9, the latch (r<sup>2</sup>) being in its slot and the latch (r<sup>3</sup>) raised and the shell and bar locked together, now, as the head is pushed toward the inner end of the raceway, the beveled end of the latch (r<sup>2</sup>) will strike the incline (r<sup>4</sup>) and said latch will be raised and the bar and shell unlocked, the continued movement toward the right bringing said stud (r<sup>6</sup>) against the end of the incline (r<sup>4</sup>) stopping the bar and permitting the shell to slide upon the bar until the latch (r<sup>3</sup>) drops into its slot (r'), thus stopping the sliding movement of the shell on the bar, and the movement of the head. When the head moves in the opposite direction the latch (r<sup>3</sup>) acts to release the shell and the stud (r<sup>6</sup>) acts as a stop as above. The parts are so spaced and arranged that the stud strikes against the inclines (r<sup>4</sup>) (r<sup>5</sup>) to stop the bar immediately before the sliding movement of the shell upon the bar is to take place and immediately after the latches have been raised.

The positions of the several parts above described at the inner and outer end of the raceway are clearly shown in Figs. 5 and 9.

(e<sup>3</sup>) represents a bar similar to the bar (e) secured in the outer end of the shell with a central longitudinal aperture (e<sup>4</sup>).

(e<sup>5</sup>) represents a handle having a screw-threaded end (e<sup>6</sup>) arranged to engage a screw-threaded aperture (e<sup>7</sup>) in the shell and in the bar (e<sup>3</sup>) and to protrude into the aperture (e<sup>4</sup>).

(s) represents my improved shed-former. This has the general structure and arrangement of a worm, the pitch of which is arranged to correspond to the diagonal distance of the squares in the cane fabric, and also correspond to the pitch of the screw-threads in the nut (n). At its outer free end, preferably in the last turn of the worm, there is formed an enlargement (s') provided with an aperture (s<sup>2</sup>). At its other end this shed-former is made with close coils (s<sup>3</sup>) soldered together and secured in a sleeve (t). A set-screw (t') mounted in this sleeve impinges upon this part of the shed-former and holds the latter in said sleeve. This sleeve is mounted upon a nipple (t<sup>4</sup>) screwed or otherwise secured in the inner end of the bar (e). This nipple is provided with an aperture (t<sup>6</sup>) corresponding to and forming a continuation of the aperture (e') in the bar (e). A cap (t<sup>2</sup>) is secured by screw-threads upon the end of the sleeve but loose on the nipple (t<sup>4</sup>). The adjacent parts of the sleeve (t), the cap (t<sup>2</sup>) and the nipple (t<sup>4</sup>) are provided with grooves in which are placed anti-friction balls (t<sup>3</sup>). By this construction and arrangement the sleeve with the shed-former is secured to the nipple and free to turn thereon.

(h) represents my improved diagonal strand-carrier which is arranged within the turns of the shed-former, passes through the apertures in the nipple (t<sup>4</sup>) and the block (e), and is secured in the block (e<sup>3</sup>) by means of the screw-threaded end of the handle (e<sup>5</sup>). By this arrangement it will be seen that the diagonal strand carrier is secured to the shell of the head but is free to reciprocate in the bar (e) and in the shed-former. At its free end this diagonal strand carrier passes through the aperture (s<sup>2</sup>) in the enlargement (s') which serves as a sheath for said carrier while the shed is being formed. The carrier at its free end is provided with an aperture (h') in which the cane-stock is inserted. The construction and arrangement of the parts are such that when the head is pushed inward to insert the shed-former in the fabric, the end of the carrier is sheathed in the enlargement (s); that is to say, the part of the head F are in the position shown in Fig. 9. When, however, the head reaches the inner end of the raceway, the latch (r<sup>2</sup>) is thrown up as heretofore described, the shell and bar are unlocked, and the shell is slid upon the bar, thus forcing the carrier out from the shed-former. (See Fig. 7.) The cane-stock is then introduced into the aperture (h') either by hand or machinery, as is desired. The head F is then drawn back to its original position. As it reaches the outer end of the raceway, the latch (r<sup>3</sup>) strikes the incline and



again unlocks the shell and bar, permitting the shell to slide and withdraw the free end of the carrier within its sheath or the enlargement (s').

5 The operation of the shed-former is as follows: Inserting the free end of the shed former at any juncture of the regular warp and weft and pushing it across the fabric, the shed-former will travel in a diagonal line and  
10 coil about the several junctures of the regular warp and weft in that line. During this operation the enlargement (s') in which the free end of the carrier is sheathed spreads the fabric, forming a shed, and at the same time  
15 inserting the carrier in said shed. After it has passed through the fabric to form a shed, the carrier is unsheathed automatically as heretofore described, the stock is introduced into the carrier and upon a reverse movement  
20 of the head the stock is drawn through the fabric in the shed thus formed.

The nut (n) while not absolutely essential to the operation of the device is yet a very useful adjunct since it compels the shed-former to turn without exerting any strain  
25 upon the fabric. But for this the fabric would have to take the strain occasioned by compelling the shed-former to turn. Moreover, by having this nut the shed can be formed with  
30 certainty at a particular point, the shed-former being assured of entering the fabric at the desired place.

The table (c) is provided with a channel (c<sup>6</sup>) running diagonally of said table and in continuation of the line of the raceway and forms  
35 a trough in which to guide the shed-former and in which the shed-former turns. It is as a matter of fact a sort of a continuation of the nut.

40 (d) represents the fabric adjuster and holder composed of side-bars (d<sup>4</sup>) and cross-bars (d'). This fabric adjuster and holder is intended to extend across the fabric in a diagonal line over the channel (c<sup>6</sup>) and, is provided with pins (d<sup>2</sup>) that are arranged to extend into the square openings in the fabric and pass into openings (c<sup>8</sup>) in the table (c). Thus the fabric is held against any tendency toward distortion and the particular place in  
50 the fabric where the shed-former should enter is presented with certainty each time in the proper place for the shed-former to engage. As stated above, this fabric adjuster and holder is arranged along the diagonal line in which the shed-former travels. As fast  
55 as one diagonal strand is introduced the fabric adjuster and holder is removed by any suitable means as a handle, the fabric is changed to present a place for a new diagonal strand, the fabric adjuster and holder is inserted and the head F is given another reciprocation. Any number of these heads may be used together, in gangs if desired but the structure and operation would be the same as for one.

65 I have not attempted to set forth all the forms in which my invention may be embodied, but have here shown a preferred form.

I wish it to be understood that I consider my invention as including broadly a head carrying a shed-former and a reciprocating  
70 diagonal strand carrier.

The cane-stock may be cut up into proper lengths previous to the insertion into the carrier, or it may be fed off from a spool and cut after the stock has been inserted into the fabric. The cane-stock will ordinarily of its own  
75 accord leave the carrier after said carrier is free from the fabric. To insure certainty, however, shears or any nipping or pinching device may be applied to the stock on the opposite side of the loom from the raceway.  
80

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which  
85 it may be made or all of the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. In a loom, in combination, a suitable framework, a rotary shed-former, a reciprocating carrier located within said former, and  
90 separate means for carrying and operating said parts, substantially as and for the purpose set forth.

2. In a loom, in combination, a suitable frame-work, a reciprocating head, a rotary shed former connected to said head, a reciprocating carrier located within said former and also connected to said head, means for reciprocating said head, and means for reciprocating said carrier at the end of each movement of said head, substantially as and for the purpose set forth.  
100

3. In a loom, in combination, a suitable frame-work provided with a raceway, an internal screw-threaded nut on said frame at the end of said raceway, a reciprocating head mounted in said raceway, a rotary shed former connected to said head and arranged to turn in said nut, a reciprocating carrier located within said shed former and connected to said head, means for reciprocating said head, and means for reciprocating said carrier at the end of each movement of said head, substantially as and for the purpose set forth.  
105 110 115

4. In a loom, in combination, a suitable frame-work, a rotary helical shaped shed former provided with an apertured enlargement near its free end, a reciprocating carrier located within said former and movable in said aperture to have its free end alternately sheathed and unsheathed by said enlargement, and means for rotating said former and reciprocating said carrier, substantially as and for the purpose set forth.  
120 125

5. In a loom, in combination, a suitable frame-work, a raceway, a reciprocating head mounted in said raceway, a rotary helical-shaped shed former connected to said head and provided at its free end with an apertured enlargement, a reciprocating carrier located within said former and aperture, said carrier being connected at one end to said head and provided with an aperture at its free end,  
130



means for reciprocating said head, and means for respectively sheathing and unsheathing said carrier during the forward and return movement of said head, substantially as and  
5 for the purpose set forth.

6. In a loom, in combination, a suitable frame-work, a raceway, a reciprocating head mounted in said way comprising a shell and an inclosed centrally apertured reciprocating bar, latches for holding said bar and shell together, a rotary helical-shaped shed former connected to said bar at one end and provided near its free end with an apertured enlargement, a reciprocating carrier arranged  
15 within said former and bar and aperture and free to slide therein but connected to said shell, means for reciprocating said head, means near the ends of said raceway to lift said latches and permit said shell to slide upon said bar to respectively protrude and withdraw said  
20 carrier at the end of the forward and backward movement of said head, substantially as and for the purpose set forth.

7. A head comprising a shell and an apertured bar arranged within said shell, an apertured nipple secured in said bar and provided with an exterior groove, a sleeve provided with a cap mounted upon said nipple, said cap and sleeve being provided with  
30 grooves registering with the groove in the nipple anti-friction balls mounted in said groove a rotary shed-former connected to said nipple, and a carrier located within said former and connected to said shell, substantially as and for the purpose set forth.  
35

8. A head comprising a shell, a sliding bar mounted in said shell and provided with slots ( $r$ ) ( $r'$ ), spring pressed latches ( $r^2$ ) ( $r^3$ ) mounted on said shell and arranged to alter-

nately engage said slots, inclines ( $r^4$ ) ( $r^5$ ) arranged to alternately engage said latches to move them out of engagement with said slots, a rotary shed-former connected to said bar, and a carrier located within said former and connected to said shell substantially as and  
45 for the purpose set forth.

9. A head combined with a rotary shed-former comprising in its construction a worm or helically formed wire ( $s$ ) provided near its free end with an enlargement ( $s'$ ) apertured  
50 as at ( $s^2$ ), and a carrier secured to said head and mounted within said shed-former and aperture, and having a longitudinal movement independent of said former whereby its end is sheathed and unsheathed by the  
55 enlargement ( $s'$ ), substantially as and for the purpose set forth.

10. In a loom, in combination, a suitable framework, a reciprocating head, a rotary shed-former connected to said head a reciprocating carrier located within said shed-former and also connected to said head, a table provided with a channel in line with the line of travel of said head and provided with apertures upon the sides of said channel, and a  
60 fabric adjuster and holder having pins arranged to pass through the fabric and enter said apertures, substantially as and for the purpose set forth.

In testimony whereof I have signed my  
70 name to this specification, in the presence of two subscribing witnesses, this 22d day of December, A. D. 1894.

EDWARD G. WATKINS.

Witnesses:

A. D. HARRISON,  
ROLLIN ABELL.