

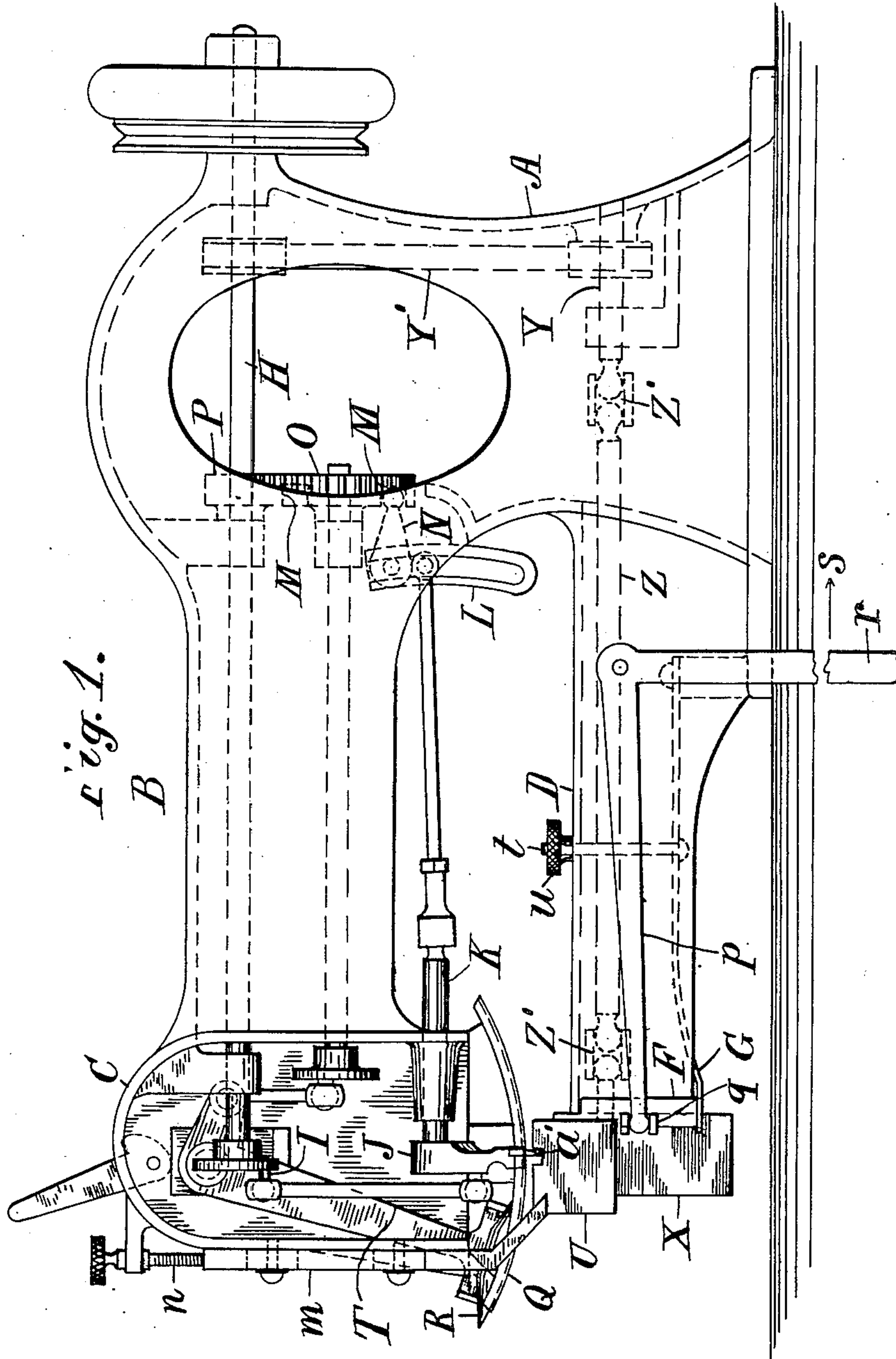
No. 862,548.

PATENTED AUG. 6, 1907.

J. E. FEFEL.  
UNIVERSAL FEED FOR SEWING MACHINES.

APPLICATION FILED OCT. 30, 1906.

3 SHEETS—SHEET 1.



Witnesses:  
L. Loe,  
Daison D. Harrington.

Inventor.  
John E. Fefel, per  
Thomas S. Crane, Atty.

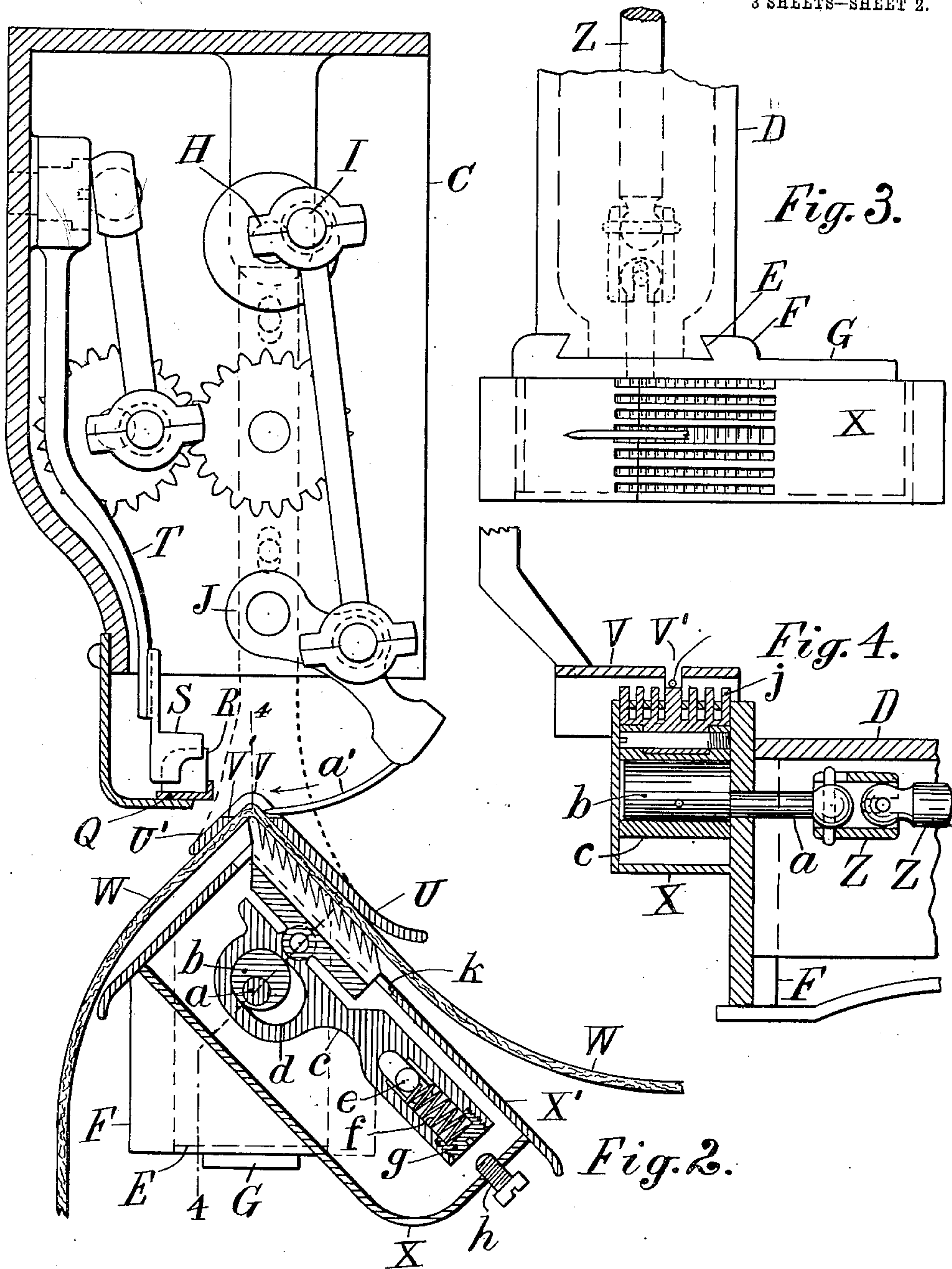
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3 SHEETS—SHEET 2.



Witnesses:  
L. Lee,  
Daison D. Livingston.

Inventor,  
John E. Fefel, per  
Thomas S. Crane, Atty.

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3 SHEETS—SHEET 3.

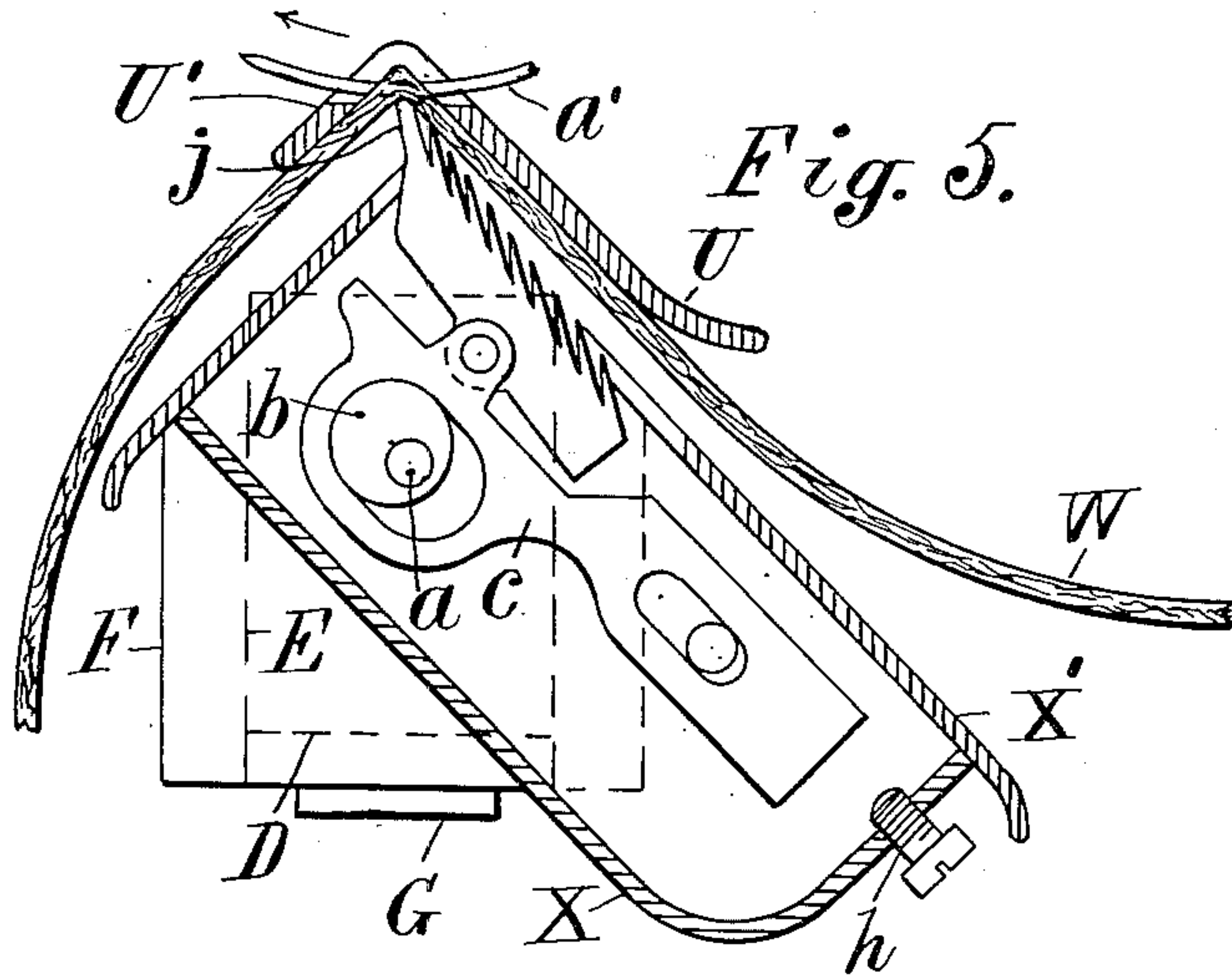


Fig. 7.

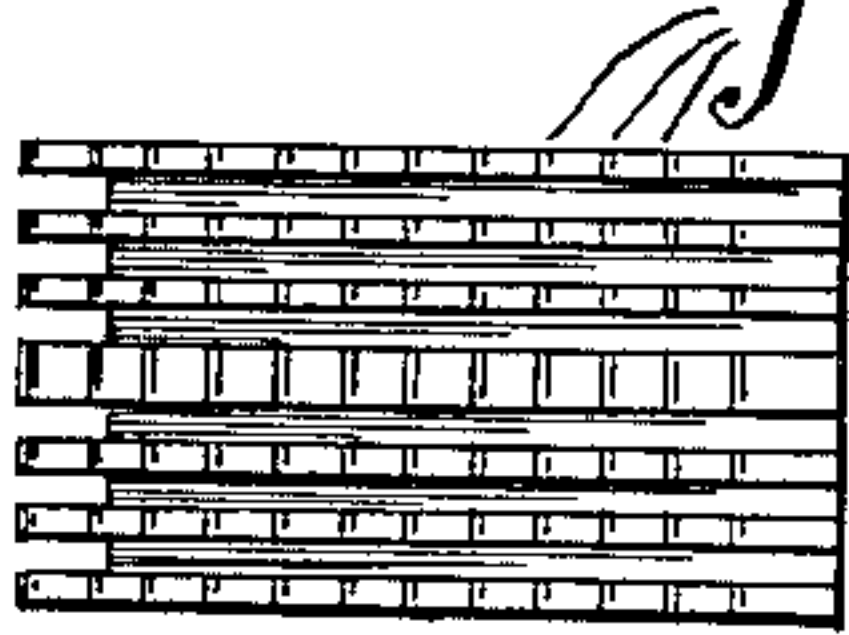


Fig. 8.

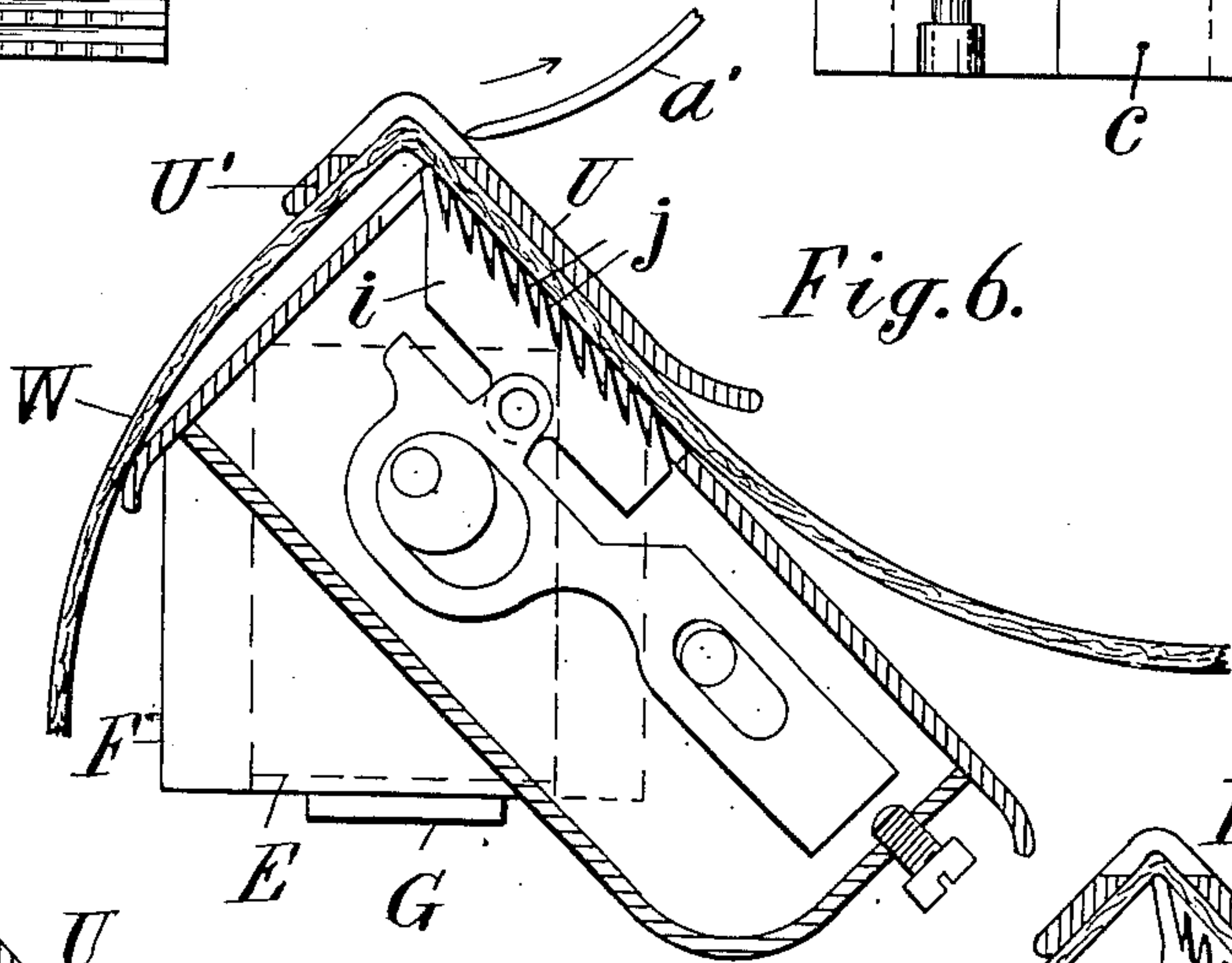
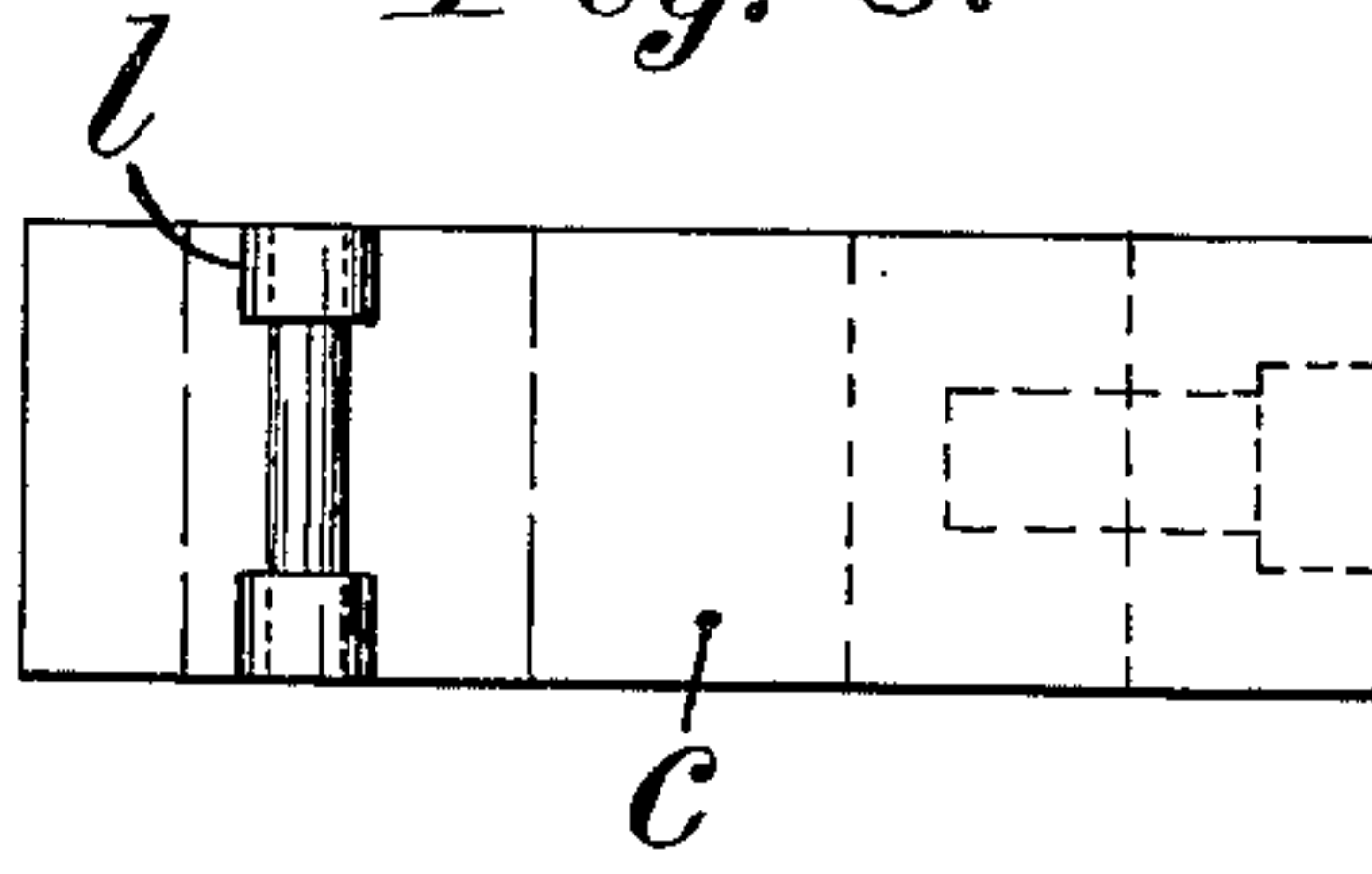


Fig. 9.

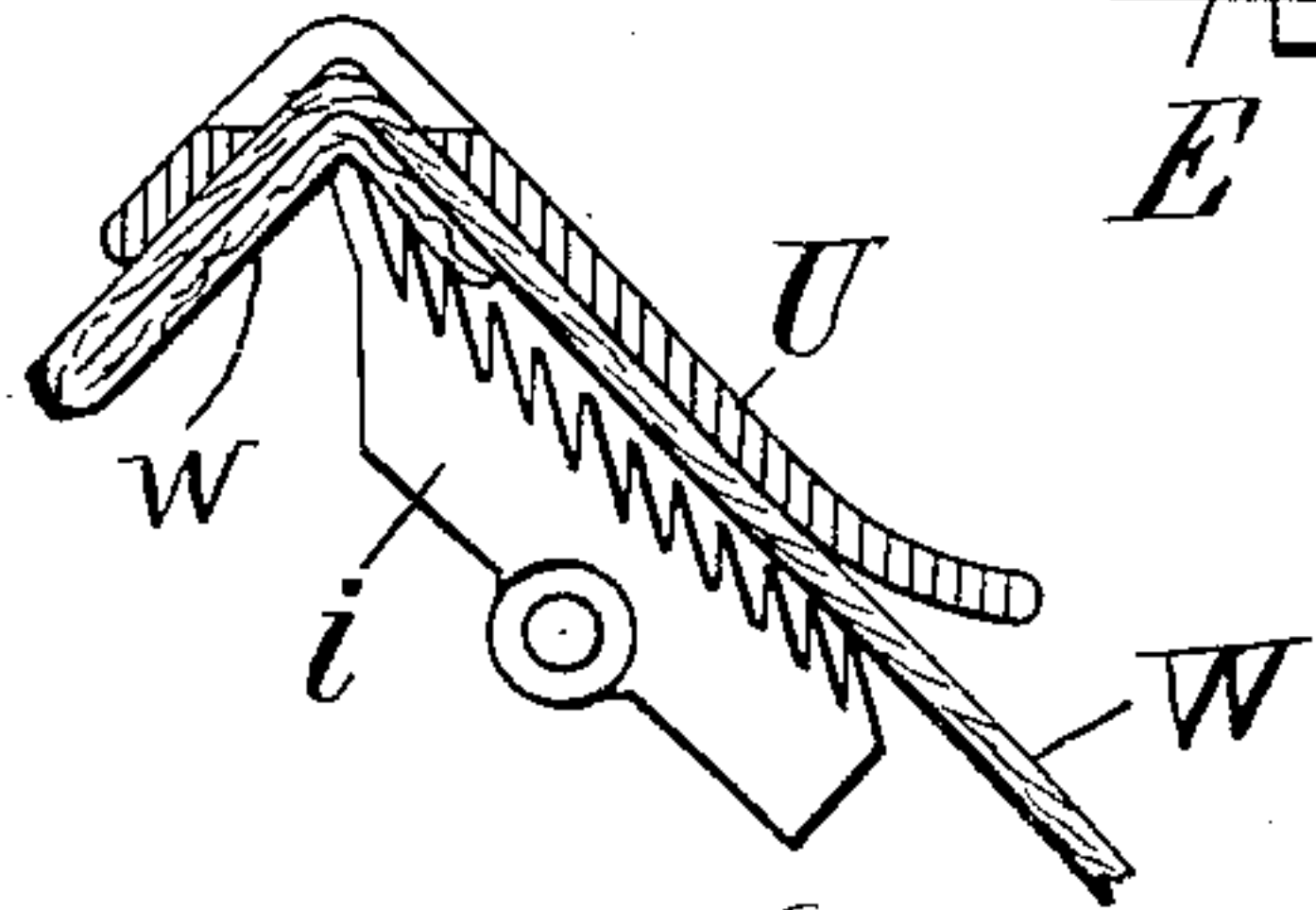
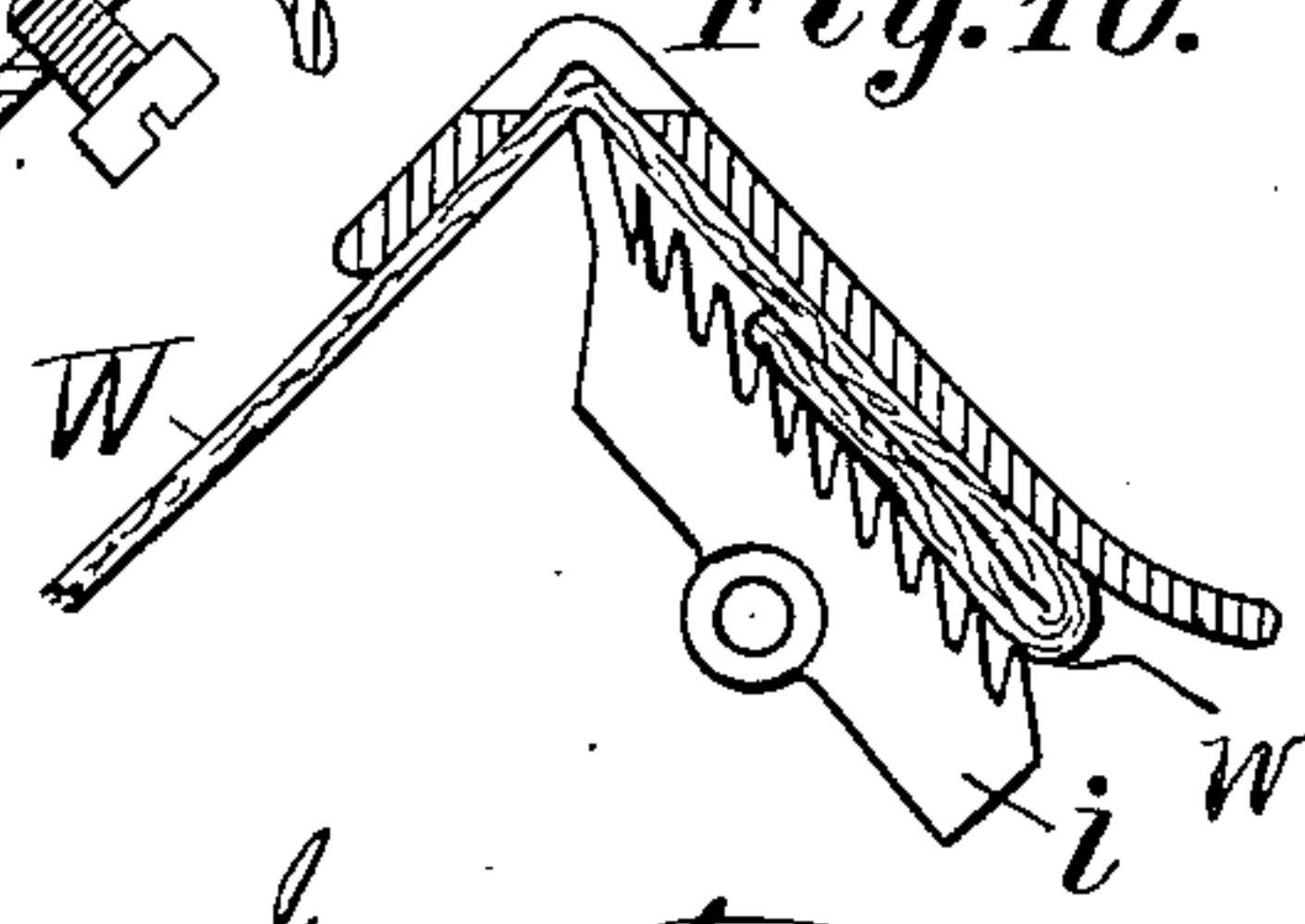


Fig. 10.



Witnesses:  
L. Lee.  
Daison D. Harrington

Inventor.  
John E. Fefel, per  
Thomas S. Crane, atty



# UNITED STATES PATENT OFFICE

JOHN E. FEFEL, OF BROOKLYN, NEW YORK, ASSIGNOR TO U. S. FELLING MACHINE COMPANY,  
OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## UNIVERSAL FEED FOR SEWING-MACHINES.

No. 862,548.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed October 30, 1906. Serial No. 341,245.

*To all whom it may concern:*

Be it known that I, JOHN E. FEFEL, a citizen of the United States, residing at 632 Sterling Place, Brooklyn, county of Kings, and State of New York, have  
5 invented certain new and useful Improvements in Universal Feeds for Sewing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to furnish a  
10 sewing machine with a feed capable of adapting itself to great and abrupt variations in the thickness of the material, when blind stitching a hem or facing upon such material.

In the present invention, a curved needle is used  
15 which moves transverse to the feed-arm which is projected from the post or frame of the machine, and the feed also operates transversely to the line of the feed-arm and in the line of the needle's movement, which causes the needle to play in the line of stitching and  
20 not transversely to the same. A foot is sustained upon the goose-neck of the machine and formed with an internal shoulder transverse to the needle's movement and transverse to the line of feed, and a feed-dog is constructed and operated to feed portions of the  
25 cloth successively in the line of the needle's movement, into contact with such shoulder, and to press and hold the cloth upon such shoulder while the needle passes into and through the cloth.

The front tooth of the feed-dog is in this invention  
30 rounded, and operated in conjunction with the foot so as to form a ridge over which the cloth is held during the penetration of the needle; the feed-dog thus operating differently from any other which operates merely to propel the cloth.

35 With a shouldered stationary foot, it is obvious that the movement of the feed-dog must vary greatly when the thickness of the material which is propelled increases or diminishes between the end of the feed-dog and the shoulder, as the movement of the feed-dog is  
40 arrested by the jamming of the material against the shoulder, and remains arrested, in the present invention while the needle penetrates the cloth. To permit such variable movements of the feed-dog, the operative mechanism of which must have a uniform throw, I  
45 sustain the means which propels the dog upon a yielding support, so that the operating means may continue its motion after the arrest of the feed-dog.

The foot is preferably sloped downwardly upon the side into which the cloth is fed, so that the foot itself  
50 and the bent portion which forms the shoulder may constitute an angular ridge through a notch in which a needle may be reciprocated to penetrate the cloth.

The requirements of the construction are all met by

employing a four-motion feed in a feed-box vertically movable upon the end of a rigid feed-arm, with a  
55 spring to press the feed-box toward the foot, the feed mechanism having an oscillating carrier movable at an angle of about 45 degrees to the vertical, and the feed-dog pivoted upon the carrier, so that when it is arrested by the contact of the cloth with the shoulder  
60 the dog may rock upon the carrier as the carrier completes its movement, and force the entire feed-box downwardly upon the feed-arm. When the dog is thus tipped, the upward movement of the spring and the feed-box holds the point of the dog into firm con-  
65 tact with the cloth upon the shoulder of the foot, the remainder of the dog's surface being partly withdrawn from contact with the cloth. The movements of the dog-carrier are so timed, that when the necessity has ceased for holding the cloth stationary, the dog com-  
70 mences its backward movement during which it is drawn below the cloth-plate, and the plate is pushed upwardly against the cloth, owing to the upward pressure of the spring beneath the feed-box.

The invention will be understood by reference to  
75 the annexed drawing, in which

Figure 1 is a side elevation of a sewing machine provided with my improvement; Fig. 2 is a diagrammatic view showing the head in section transverse to the  
80 goose-neck *b* to expose the mechanism inside, and including a vertical section of the feed-box and foot at the plane of the needle with the parts *E* and *F* in the rear. The cutting away of the front of the head removes the slide *m* which carries the foot and the support for the slide, but the slide is indicated in dotted  
85 lines to show its position. The nearer half of the race-way is omitted to show the shuttle *R* and the shuttle-carrier *S*. Fig. 2 thus combines a simultaneous view of the elements which coact together. Fig. 3 is a plan of the feed-box with the forward end of the feed-arm;  
90 Fig. 4 is a section on line 4—4 in Fig. 2, giving a transverse section of the feed-box and a vertical section of the feed-arm. Fig. 5 is an end view of the feed-box with the front cover removed, showing the dog-cam in its extreme forward movement and the dog tipped by  
95 contact with the cloth against the shoulder. Fig. 6 is a similar end view of the feed-box, with the dog at the front end of its feeding movement; Fig. 7 is a plan of the dog detached from the carrier, and Fig. 8 is a plan of the carrier with the dog removed. Fig. 9 is a section  
100 of the foot and feed-dog showing a hem over the forward end of the dog, and Fig. 10 is a similar view with the hem over the rear part of the dog.

A designates the post of the sewing machine frame, having goose-neck *B* with head *C* upon the forward  
10 end, carrying the gearing to actuate a curved needle



and a shuttle across the path of the needle above the level of the foot. The feed-arm D is shown projected from the post beneath the goose-neck, and formed with vertical slides E to which gibs F upon the feed-box G are fitted. A spring G' presses the feed-box normally upward. A feed-shaft H is shown extended through the goose-neck and provided with a crank-pin I to oscillate a needle-carrier J which is mounted upon a reciprocating pivot-shaft K to form zigzag stitches, the shaft being reciprocated by a segment L, and an arm N fitted to a cam-groove M in a gear O, which is driven by a gear P upon the driving-shaft H. A curved raceway Q is sustained upon the head C transverse to the path of the needle, and notched at one side for the passage of the needle. A shuttle R is reciprocated in the raceway by a shuttle-carrier S mounted upon an arm T, which is vibrated by suitable connections to the driving-shaft H.

The mechanism for operating the needle and shuttle to form a stitch, is fully set forth in my application No. 332,765 filed August 31, 1906 for patent on sewing machine for felling, and requires no further description herein.

The foot U and its shoulder U' are shown in Fig. 2 sloped, each, downwardly at an angle of about 45 degrees to the vertical, from the apex V, which forms a ridge parallel to the plane of the raceway and shuttle-movement and transverse to the movement of the needle, the ridge being perforated by a notch V' to permit the passage of the needle *a'* through the cloth W inside the ridge.

The feed-box X is shown with inclined cloth-plate X' which guides the cloth upwardly at an angle of about 45 degrees beneath the foot U.

A feed-shaft Y is mounted in the post A and rotated by connections Y' to the driving-shaft H.

A feed-bar Z is extended in the feed-arm to an eccentric shaft *a* which drives the eccentric *b* of the four-motion feed within the feed-box X. The feed-bar Z is coupled to the eccentric shaft and the feed-shaft by universal joints Z', which maintain the connection with the eccentric shaft as the feed-box moves vertically upon the feed-arm.

The dog-carrier *c* is extended backwardly from the slot *d* in which the eccentric rotates, and its rear end is slotted and fitted to a guide-stud *e*. The carrier is recessed behind the guide-stud and a spring *f* inserted between the guide-stud *e* and a screw-cap *g* in the end of the carrier.

The usual regulating screw *h* is shown for varying the extent of the feed.

The cloth-plate X' is shown with seven longitudinal slots *k*, and the dog is formed with a body *i* having seven rows of teeth *j* projected outwardly through the slots when feeding, the middle row of teeth being wider than the others, as shown in Fig. 4.

The body of the dog is jointed to the carrier *c* by a series of hinge-lugs *l* so that it tips freely upon the carrier, and the normal upward movement of the feed-box thus holds the dog in any position that the varying thickness of the cloth may induce.

Where the cloth is of uniform thickness, the dog lies parallel with the under surface of the foot U, as shown in Fig. 2; but where a thick seam or folding of layers produces an abrupt variation in the thickness of the

cloth, the dog tips so as to contact with the thinner portion and the thicker portion simultaneously, and thus grasps the cloth and feeds it forward positively.

The eccentric is shown in its extreme forward position in Fig. 5 which moves the carrier always to the same limit, but the feed-box is so adjusted in relation to the shoulder U' upon the foot, that the dog is arrested by the cloth before the carrier has reached its extreme forward position, and no further movement of the carrier would be possible, except for the pivoting of the dog upon the carrier and the yielding support of the feed-box which enables it to crowd downwardly as the carrier completes its movement; but involving the tipping of the dog away from the cloth at its rear end, as shown in Fig. 5. The upward pressure of the spring G' is at such times sustained wholly upon the front end of the dog, the front tooth of which is made thick and rounded to sustain such pressure without injuring the cloth. The pressure is also distributed over a considerable area by the multiplication of the rows to teeth which give the dog a considerable breadth and surface to press upon the cloth.

It will be understood that a yielding support for the dog-carrier, that is, one which can move downwardly and which is pressed normally upward, is essential to permit the dog to press or hold the cloth against the shoulder during the movement of the needle through the cloth, and to produce such effect irrespective of the thickness of the cloth, as such thickness operates to arrest the movement of the dog sooner or later in its forward motion, which is imparted by the eccentric *b*.

Fig. 9 shows the front end of the feed-dog tipped downwardly or away from the foot by a hem *w* of the cloth W which lies across the front end of the dog; and Fig. 10 shows the rear end of the dog tipped away from the foot by a hem *w* pressing upon the rear part of the dog. The mounting of the dog upon the pivoted carrier thus enables the dog to assume different positions in relation to the foot during its forward feeding movement, and without affecting the movement of the dog-carrier when the dog is arrested by the contact of the cloth with the shoulder, at any point in the carrier's movement.

The foot U is made adjustable vertically upon the head by a slide *m* having an adjustable screw *n*, but in practice is maintained constantly in the same position when properly adjusted, as the yielding nature of the feed-box X permits the movement of the feed-dog *i* to accommodate itself to materials of different thickness.

The foot being fixed, it is necessary to lower the feed-box to separate the box from the foot when inserting the material to be sewed, and such lowering is effected by a bell-crank lever having one arm *p* engaged with the feed-box by lugs *q*, and the other arm *r* extended downward by the knee of the sewing machine operator, who can press it to the right, as indicated by arrow *s*, whenever it is necessary to press the feed-box downwardly. The spring G of course presses the feed-box upwardly again and clamps the cloth against the foot-plate, as soon as the pressure of the knee is removed. A screw *t* having a thumb-nut *u* is shown applied to the spring G for varying its tension, and the upward pressure of the dog upon the cloth. Any suitable means may be employed by which the operator can lower the feed-box upon the arm, when inserting or removing the cloth.



The construction furnishes a most positive feed for a blind stitching machine, adapted to compensate for great variations in the thickness of the material and thus feeding the cloth uniformly whatever variations occur.

It will be understood from the above description that although the cloth-plate is preferably inclined toward one side of the feed-arm and the foot similarly inclined, as has been the case in some previous machines, the feed operates differently from prior machines in feeding the cloth toward the ridge of the foot, which thus feeds the cloth transverse to the ridge and in the line of the needle's movement. The feed-dogs also differ from others previously used, in having the front tooth formed to support the cloth in the form of a ridge, so that the needle can enter at one side of such ridge and emerge from the cloth upon the other side; the ridge upon the dog standing stationary during the penetration of the cloth by the needle.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate to support the cloth, and a curved needle moved transversely to the feed-arm, the top portion of said plate forming a ridge, of a bifurcated foot sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, said foot formed with the notch V' for the passage of the needle, and a feed-dog operating through the cloth-plate to feed portions of the cloth in succession transversely to the feed-arm toward such shoulder and in the line of the needle's movement, and to hold the cloth in contact with the shoulder during the operation of the needle.

2. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate to support the cloth and a curved needle moved transversely to the feed-arm, the top portion of said plate forming a ridge, of a bifurcated foot sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, said foot formed with the notch V' for the passage of the needle, and a feed-dog operating through the cloth to feed portions of the cloth in succession transversely to the feed-arm toward such shoulder and in the line of the needle's movement, and to hold the cloth in contact with the shoulder during the operation of the needle, and means for giving the dog a substantially uniform stroke, such means being adapted to yield during the pressure of the cloth against the shoulder.

3. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate to support the cloth, such cloth-plate being sloped downwardly toward one side of the arm and the top portion of said plate forming a ridge, of a curved needle moved transversely to the ridge, and a bifurcated foot U sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, said foot formed with a notch V' for the passage of the needle, a feed-dog operating through the cloth-plate to feed the cloth upwardly toward the shoulder transverse to the ridge and in line with the needle's movement, and means for holding the dog in contact with the cloth against the shoulder during the operation of the needle.

4. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate sloped downwardly toward one side of the arm, the top portion of said plate forming a ridge, of a curved needle moved transversely to the ridge, and a bifurcated foot sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, and formed with a notch V' for the passage of the needle, a feed-dog operating through the cloth-plate to feed the cloth upwardly toward the shoulder transverse to the ridge and in line with the needle's movement, and means for holding the dog in contact with the cloth against the shoulder during

the operation of the needle, such means being adapted to yield downwardly as the dog holds the cloth against the shoulder during the movement of the needle through the cloth.

5. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate to support the cloth and a curved needle moved transversely to the feed-arm, of a foot having an angle to form an internal shoulder and such angle perforated for the movement of the needle, of a four-motion feed-dog having an eccentric to press the feed-dog and cloth toward the shoulder during the movement of the needle through the cloth, the support for the eccentric being constructed to yield downwardly during the continued rotation of the eccentric while the dog is arrested by the cloth against the shoulder.

6. In a sewing machine for blind stitching, the combination, with a feed-arm having a cloth-plate sloped downwardly toward one side of the arm, the top portion of the said plate forming a ridge, and a curved needle moved transversely to the ridge, of the bifurcated foot U sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, and having a notch V' for the passage of the needle, a four-motion feed having a dog-carrier oscillated by an eccentric, a feed-dog pivoted upon the carrier, and a yielding support for the carrier adapted to move downwardly when the feed-dog is arrested, and the feed-dog operating by pressure upon the cloth, when engaged with the said shoulder to crowd the yielding support downwardly and to hold the cloth against the shoulder during the movement of the needle through the cloth.

7. In a sewing machine for blind stitching, the combination, with a foot having an angle to form an internal shoulder and such angle perforated for the movement of the needle, of a four-motion feed having a dog-carrier oscillated by an eccentric, a feed-dog pivoted upon the carrier and operated to press the cloth against the shoulder, the support for the eccentric being adapted to yield downwardly, and the dog to tip upon the carrier while the dog is arrested by the cloth against the shoulder.

8. In a sewing machine for blind stitching, the combination, with a foot sloping downwardly and having a shoulder sloped in the opposite direction, of a rigid feed-arm upon the frame of the machine, a feed-box movable vertically upon the arm below the needle, with spring to press it normally upward, a feed-shaft in the feed-arm, an eccentric in the feed-box with universal coupling to the feed-shaft, a carrier oscillated by the eccentric, and a four-motion feed-dog jointed upon the carrier and operated to press the cloth toward the shoulder in the foot.

9. In a sewing machine for blind stitching, the combination, with a rigid feed-arm upon the frame of the machine, of a feed-box having a cloth-plate inclined toward one side of the arm, the top portion of said plate forming a ridge, of a bifurcated foot sloped downward on opposite sides of said ridge forming a ridge complementary thereto and having an internal shoulder, the ridge of the foot being formed with a notch V' for the passage of the needle, the feed-box being movable vertically upon the arm below the needle, and having cloth-plate inclined like the foot, and a spring to press it normally upward upon the arm, a dog-carrier oscillated by an eccentric below the cloth-plate, with a feed-dog pivoted upon the carrier and having rows of teeth projecting through the cloth-plate and adapted to adjust itself to the foot and to variations in the thickness of the cloth.

10. In a sewing machine for blind stitching, the combination, with a rigid feed-arm upon the frame of the machine, of a feed-box having a cloth-plate inclined toward one side of the arm, the top portion of said plate forming a ridge, a bifurcated foot sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, said foot formed with a notch V' through the ridge of the foot for the passage of the needle, the feed-box being movable transversely upon the arm below the needle, and having a spring to press it normally upward upon the arm, and a feed-dog having its front corner rounded forming a ridge to press the cloth into the corner of the foot and thereby form a ridge upon the cloth for the penetration of the needle.



11. In a sewing machine for blind stitching, the combination, with a rigid feed-arm upon the frame of the machine, of a feed-box movable vertically upon the arm with spring to press it normally upward and having a cloth-plate inclined toward one side of the arm, the top portion of said plate forming a ridge, a bifurcated foot sloped downward on opposite sides of said ridge and forming an internal shoulder complementary to the ridge, said foot formed with a notch V' through the ridge of the foot for the passage of the needle, a feed-dog having rows of teeth projecting through the cloth-plate and the forward tooth of each row rounded to press the cloth into the corner of the foot, and forming the cloth into a ridge transverse to

the movement of the needle, and bending the cloth into the ridge of the foot for the penetration of the needle, the dog-operating means being arranged and operated to yield downwardly while the cloth is pressed against the shoulder, and the feed-box having means for actuation by the operator, to lower it in opposition to the spring when removing and inserting the cloth below the foot.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN E. FEFEL.

Witnesses:

L. LEE,

THOMAS S. CRANE.