

(No Model.)

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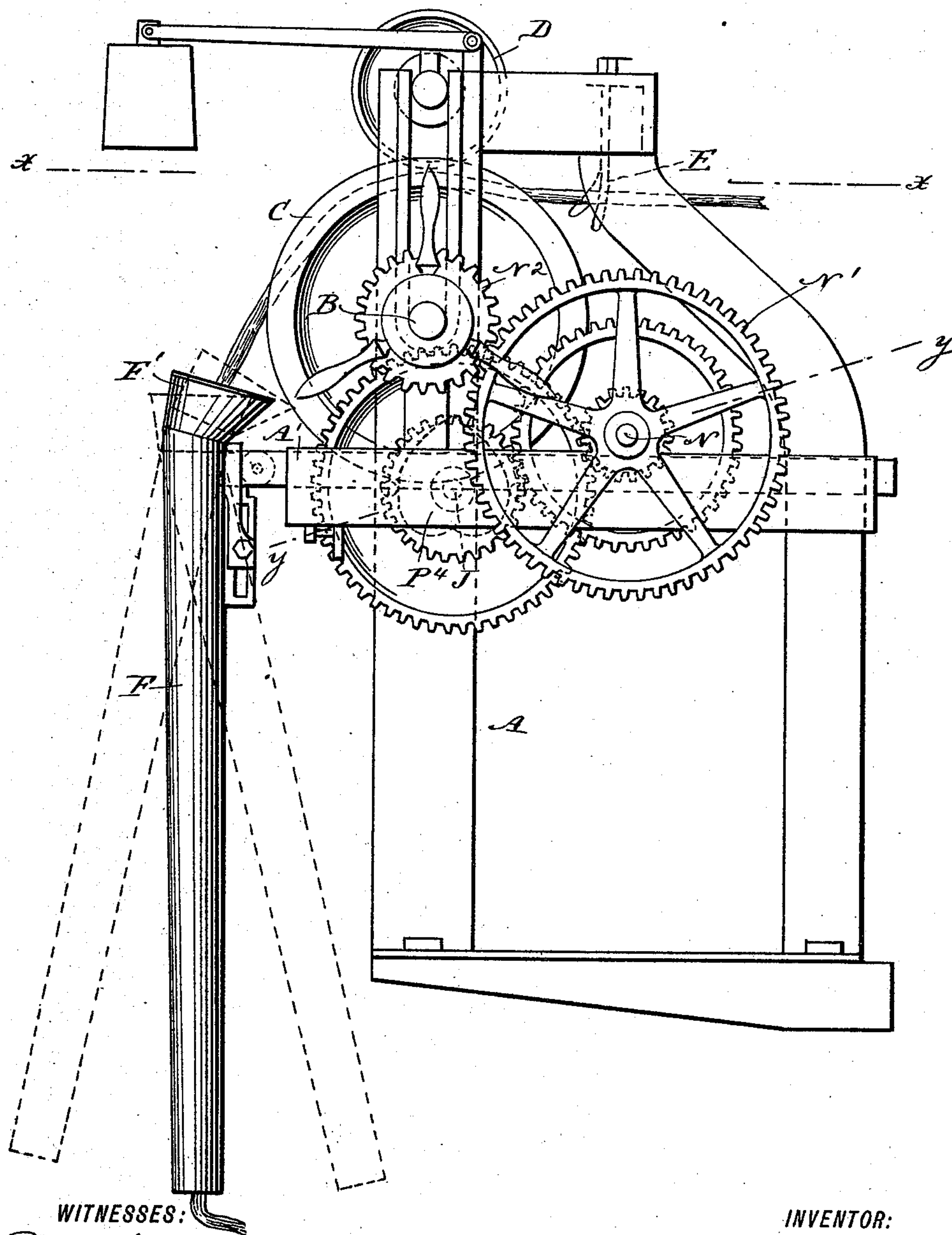
C. DENN.

WARP PLAITING MACHINE.

No. 412,482.

Patented Oct. 8, 1889.

*Fig. 1.*



WITNESSES:

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(No Model.)

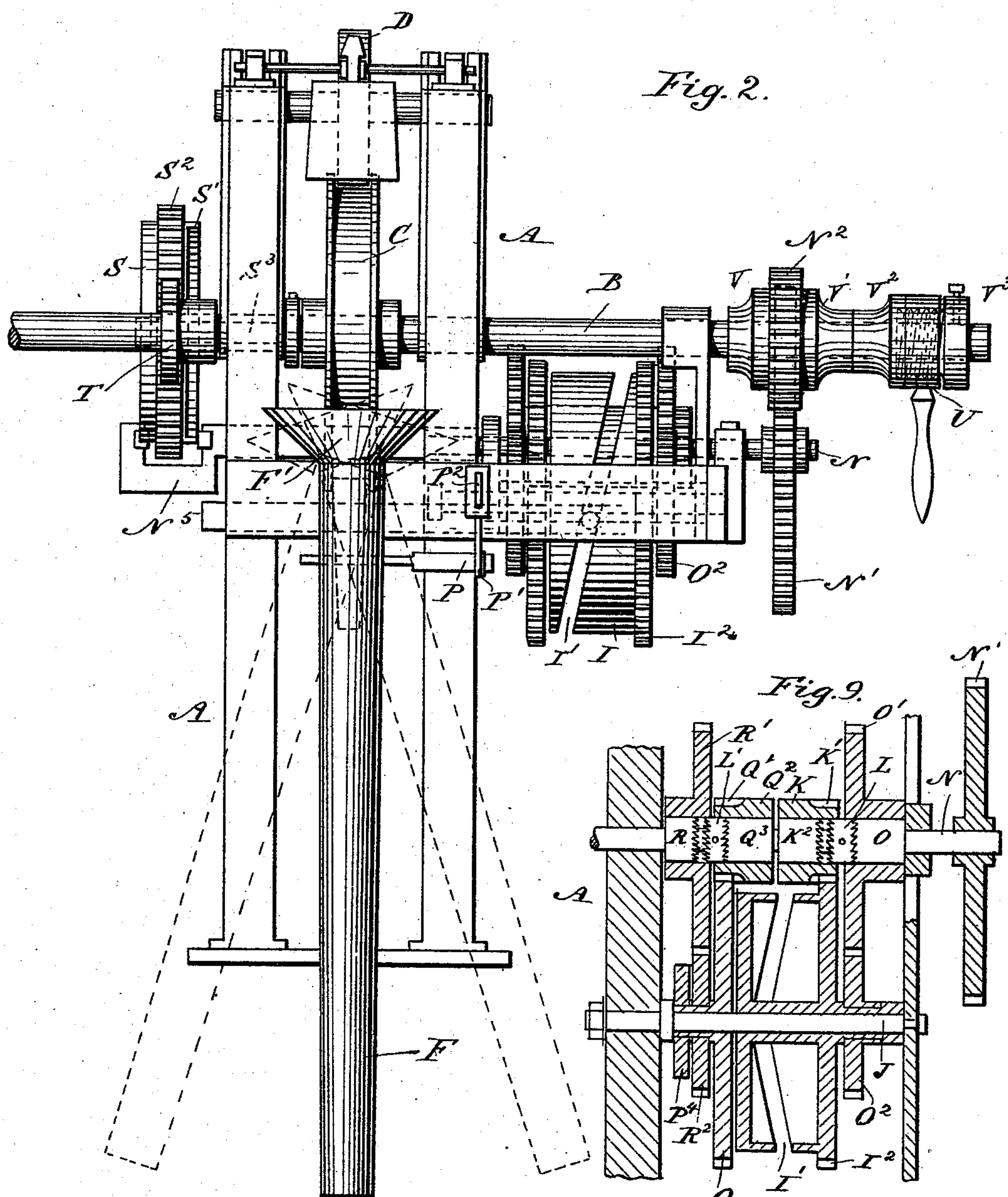
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C. DENN.

# WARP PLATING MACHINE.

No. 412,482.

Patented Oct. 8, 1889.



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(No Model.)

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C. DENN.

WARP PLAITING MACHINE.

No. 412,482.

Patented Oct. 8, 1889.

Fig. 3.

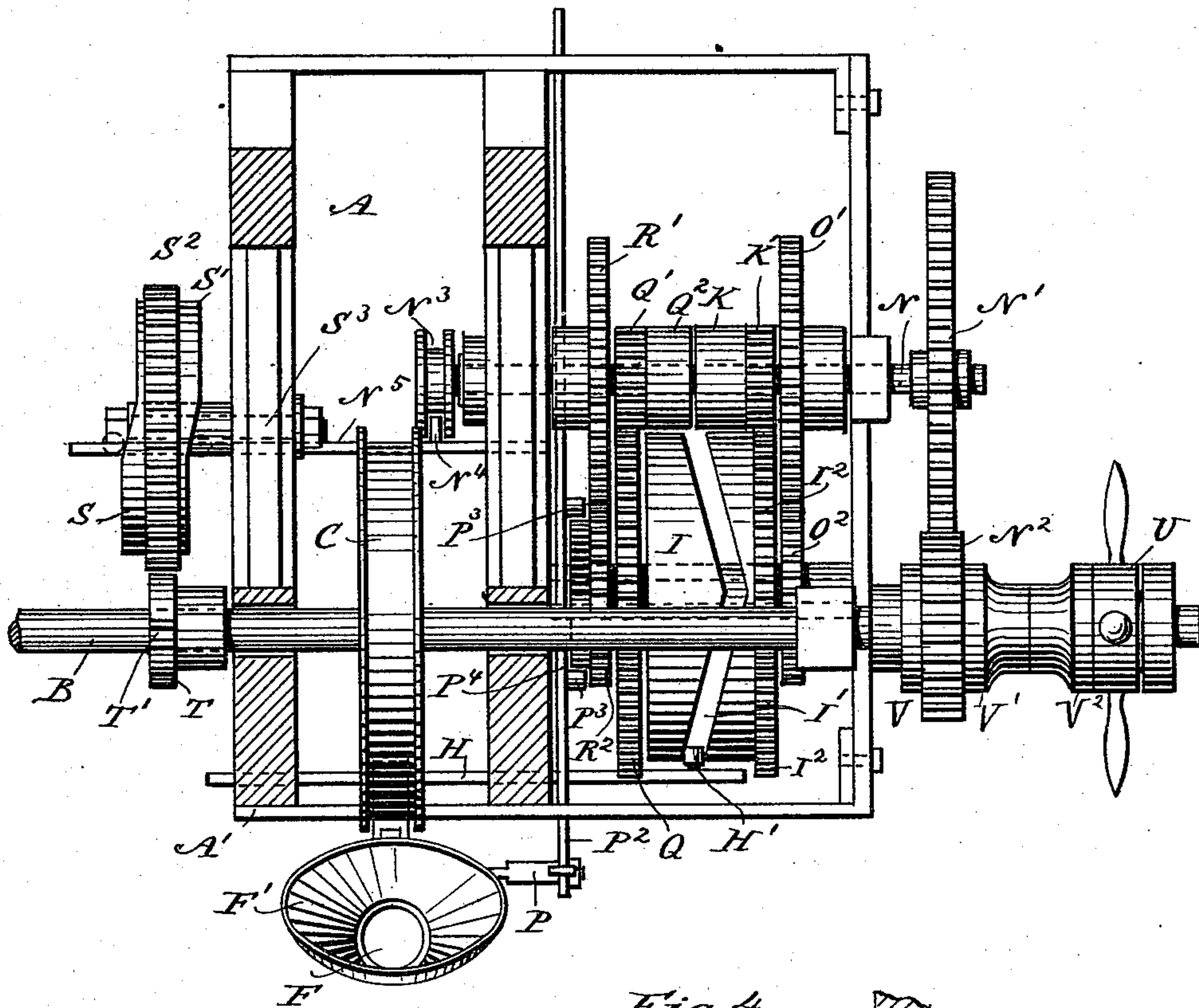
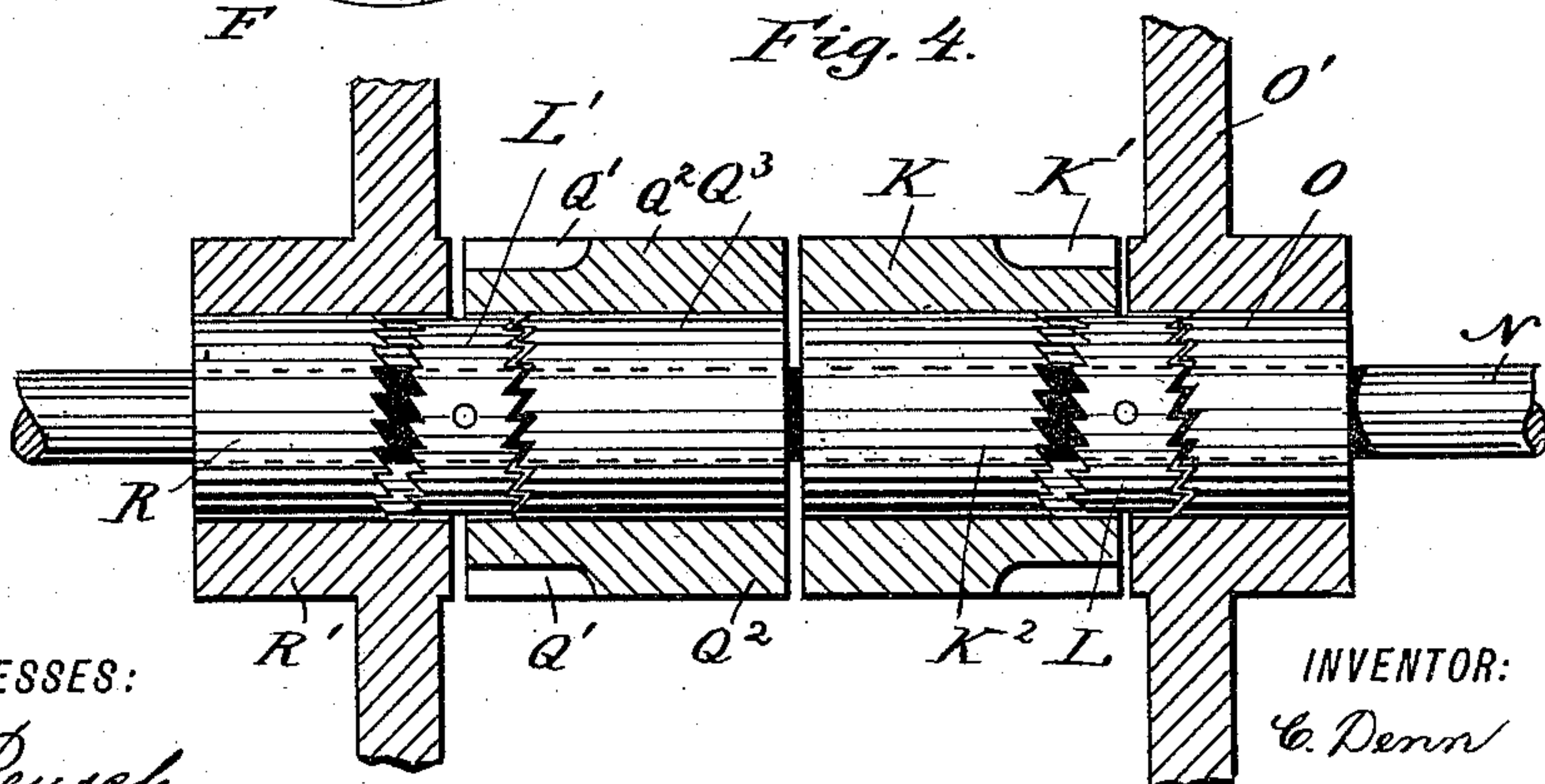


Fig. 4.



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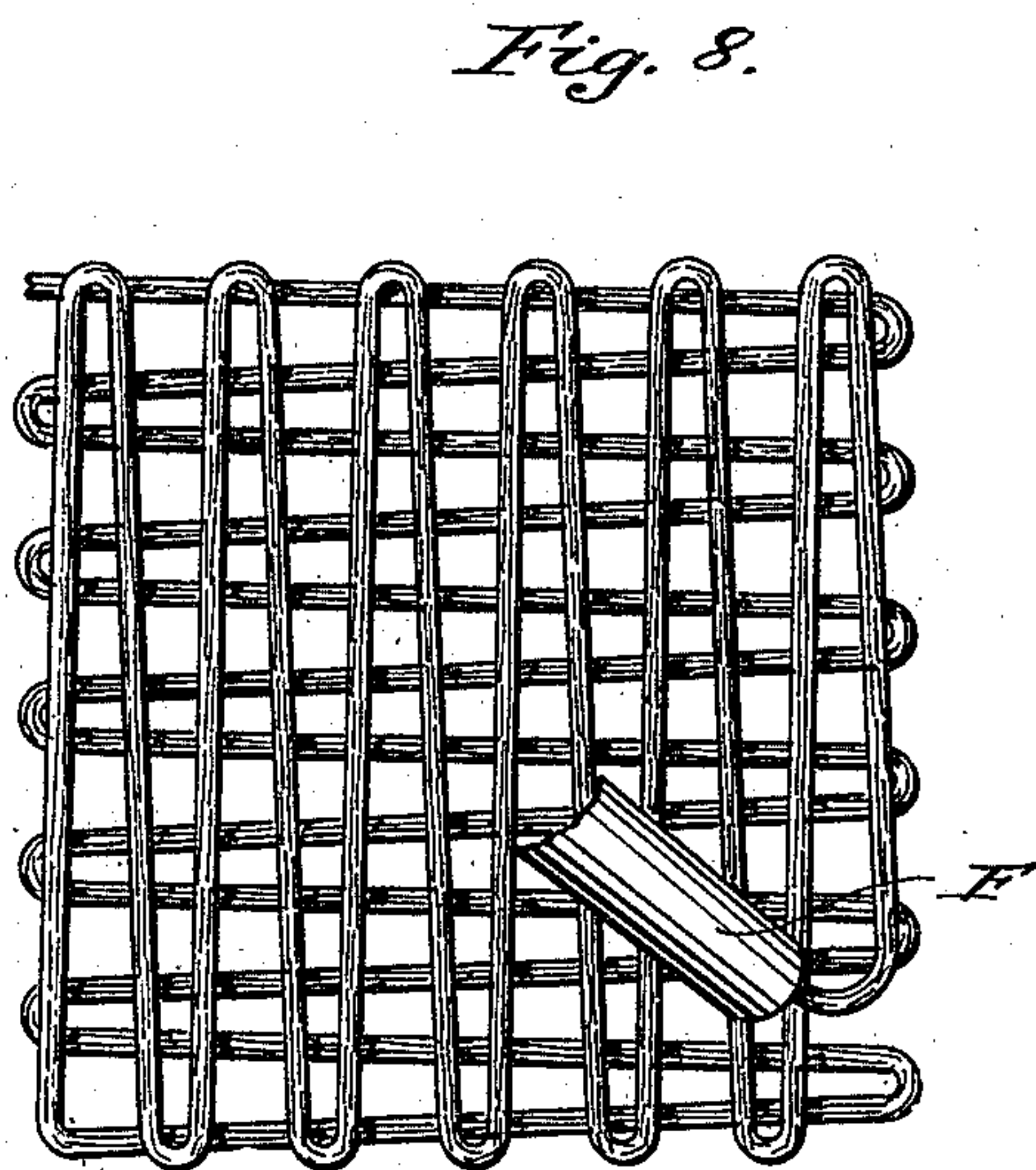
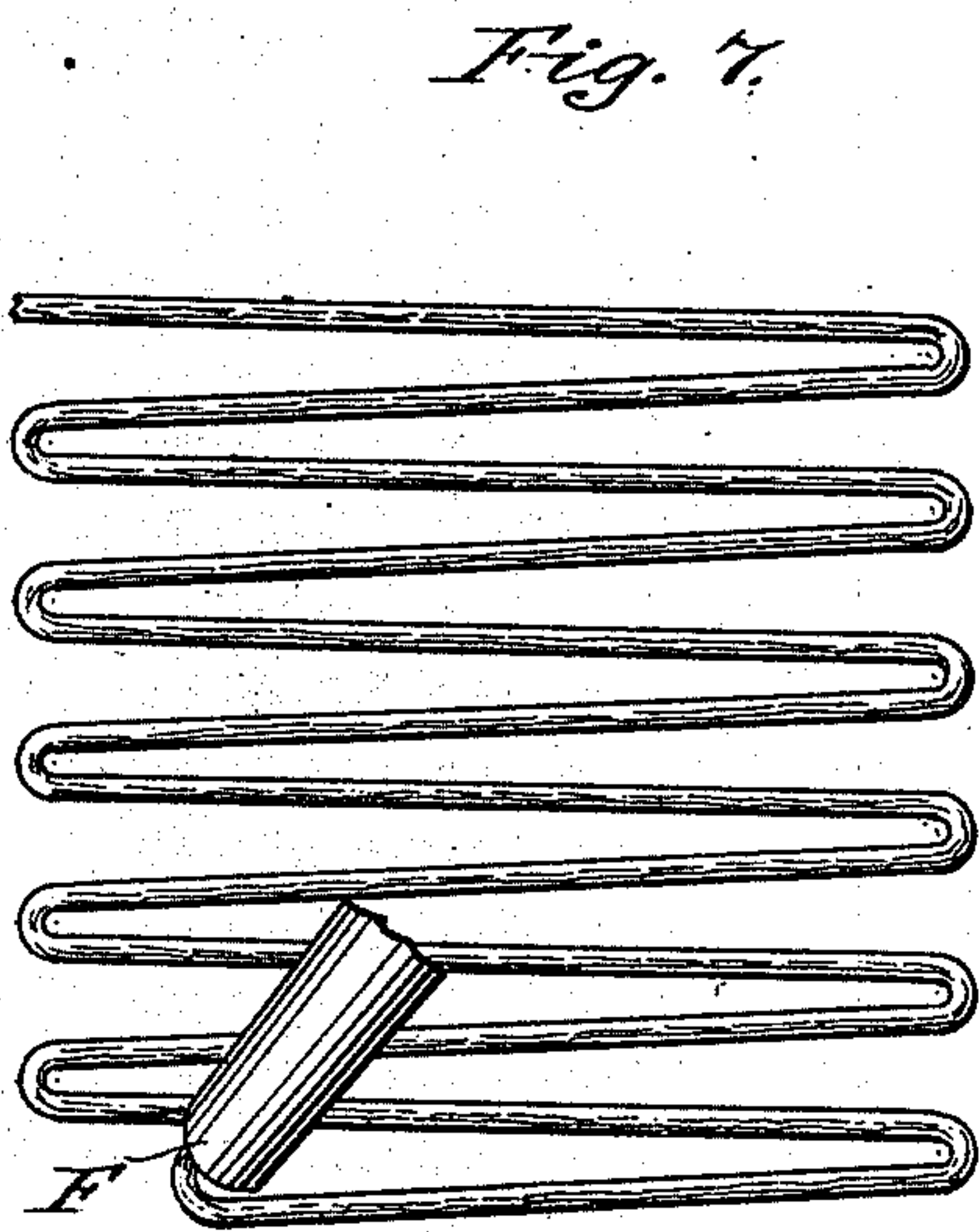
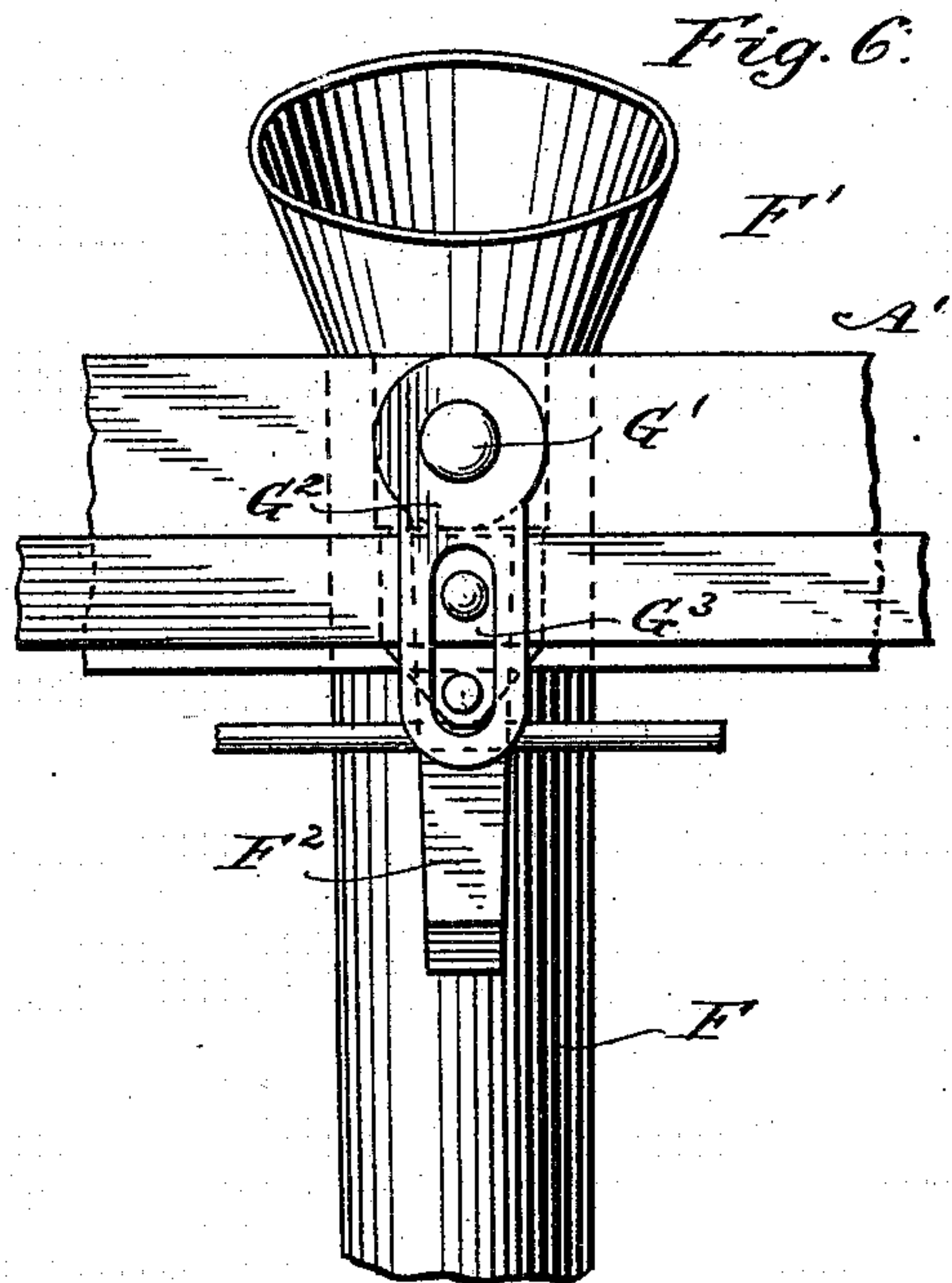
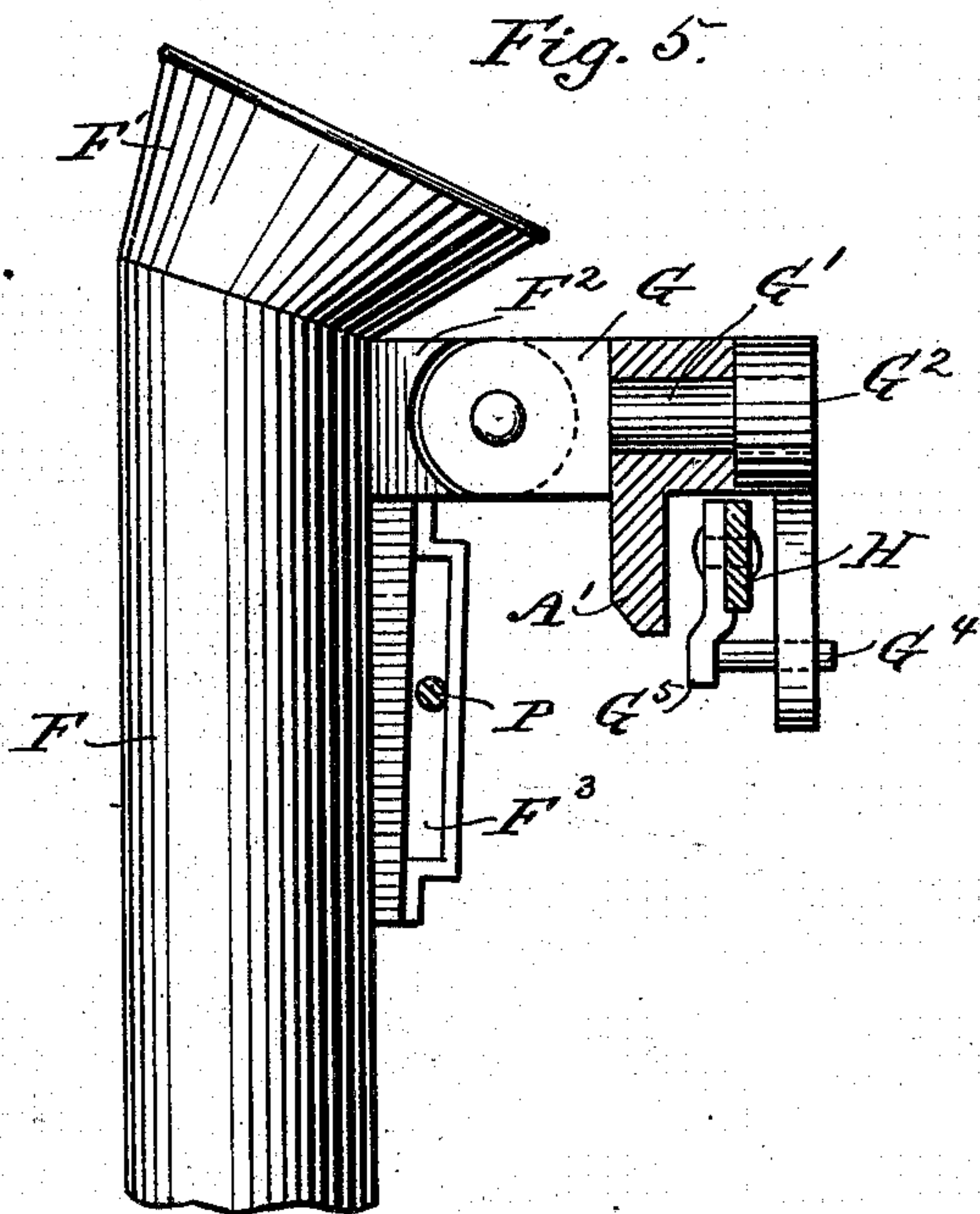
(No Model.)

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C. DENN.  
WARP PLAITING MACHINE.

No. 412,482.

Patented Oct. 8, 1889.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

CLAYTON DENN, OF PHILADELPHIA, PENNSYLVANIA.

## WARP-PLAITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 412,482, dated October 8, 1889.

Application filed July 15, 1889. Serial No. 317,510. (No model.)

*To all whom it may concern:*

Be it known that I, CLAYTON DENN, of Philadelphia, (Frankford,) in the county of Philadelphia and State of Pennsylvania, have  
5 invented a new and Improved Warp-Plaiting Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved machine which is simple  
10 and durable in construction, very effective in operation, and serves to rapidly and quickly plait down the warp as it is delivered from the warping or drying machine.

The invention consists of a tube adapted  
15 to vibrate in two directions at right angles to each other and through which the warp passes.

The invention also consists of certain parts and details and combinations of the same, as  
20 will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate  
25 corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a front view of the same. Fig. 3 is a sectional plan view of the same on the line *x x* of Fig. 1. Fig. 4 is an  
30 enlarged section of the clutch mechanism. Fig. 5 is an enlarged side elevation, with parts in section, of the tube and its supports. Fig. 6 is a rear view of the same. Figs. 7 and 8 are plan views of the plaited warp, and Fig.  
35 9 is a sectional plan view of part of the improvement on the line *y y* of Fig. 1.

The improved machine is provided with a suitably-constructed frame A, in which is mounted to turn in suitable bearings the main  
40 driving-shaft B, connected with suitable machinery for imparting a rotary motion to the said shaft. On the main driving-shaft B is secured a grooved roller C, on the top of which travels a weighted friction-roller D,  
45 and between the roller D and the grooved roller or pulley C passes the warp to be plaited down, and passing from the warping or drying machine through eyes E, held on the main frame A, to the said pulley C and  
50 roller D.

The pulley C discharges the warp into a tube F, provided on its upper end with a fun-

nel F', and adapted to swing in two directions at right angles to each other. For this purpose the tube F is provided in its upper  
55 end with an eye F<sup>2</sup>, pivoted on an eye G, provided with a spindle G', mounted to turn in a bracket A', secured on the main frame A. (See Figs. 5 and 6.) On the outer end of the spindle G' is secured a crank-arm G<sup>2</sup>, pro-  
60 vided with a slot G<sup>3</sup>, into which projects a pin G<sup>4</sup>, fastened on an arm G<sup>5</sup>, secured on a rod H, mounted to slide sidewise of the machine in suitable bearings in the main frame A.

On the rod H is held a friction-roller H',  
65 traveling in a cam-groove I', formed in the periphery of a wheel I, mounted to turn on a stud J, secured by suitable means on the frame A. On the wheel I, near one end, is secured or formed a gear-wheel I<sup>2</sup>, meshing into a pin-  
70 ion K', formed on a wheel K, secured on a clutch K<sup>2</sup>, mounted loosely on a shaft N, mounted to turn and to slide in suitable bearings formed on the main frame A. On one  
75 outer end of the shaft N is secured a gear-wheel N', meshing into a gear-wheel N<sup>2</sup>, secured to the main driving-shaft B, so that when the latter is rotated a rotary motion is imparted to the shaft N.

The clutch K<sup>2</sup> is adapted to be engaged by  
80 one clutch-face of a clutch L, secured on the shaft N and adapted to engage with its other clutch-face a clutch O, held loosely on the shaft N and carrying a gear-wheel O', meshing into a gear-wheel O<sup>2</sup>, secured on the hub  
85 of the wheel I. (See Fig. 9.) The device just described serves to impart a sidewise vibrating motion to the tube F. The device for vibrating the tube transversely to said sidewise movement is provided with a pin P, engaging  
90 a slot F<sup>3</sup>, formed in the eye F<sup>2</sup>, as is plainly shown in Fig. 5. The pin P is secured to an arm P', held adjustably on a rod P<sup>2</sup>, mounted to slide transversely in suitable bearings on the main frame A, and provided with pins P<sup>3</sup>,  
95 on which operates a heart-shaped cam P<sup>4</sup>, secured on the hub of a gear-wheel Q, mounted to turn loosely on the stud J and meshing into a pinion Q', formed on the wheel Q<sup>2</sup>, secured on a clutch Q<sup>3</sup>, held loosely on the shaft  
100 N and adapted to be engaged by one face of a double clutch L', secured on the said shaft N and similar to the clutch L, as is plainly shown in Fig. 4. The other face of the clutch L' is



adapted to engage a clutch R, fitting loosely on the shaft N and carrying a gear-wheel R', meshing into a gear-wheel R<sup>2</sup>, secured on the hub of the gear-wheel Q previously mentioned.

In order to move the clutches L and L' alternately into contact with their clutches O K<sup>2</sup> and Q<sup>3</sup> R, respectively, a sidewise sliding motion is imparted to the said shaft M by the following mechanism: On the end of the shaft N is secured a grooved collar N<sup>3</sup>, engaged by a pin N<sup>4</sup>, secured on a rod N<sup>5</sup>, mounted to slide longitudinally in suitable bearings in the frame A. The outer end of the rod N<sup>5</sup> is slotted and engaged by the cams S and S', formed on the faces of the gear-wheel S<sup>2</sup>, mounted to turn on a stud S<sup>3</sup>, secured to the main frame A. The gear-wheel S<sup>2</sup> is adapted to be engaged by two teeth T', formed on a wheel T, secured on the main driving-shaft B, so that when the latter is rotated the two teeth T' move the gear-wheel S<sup>2</sup> a short distance at every revolution of the shaft B.

In order that the mechanism for operating the tube F may be stopped without stopping the main shaft B, I mount the gear-wheel N<sup>2</sup> loosely on the shaft and clamp it between a fixed collar V and a sliding collar V'. The collar V' is forced against the wheel N<sup>2</sup> by a second sliding collar V<sup>2</sup>, acted upon by a nut U, mounted on the externally-threaded sleeve V<sup>3</sup>, (see Fig. 2,) held fixedly on the shaft B, said nut having handles or wings projecting from it. Whenever enough warp has been plaited, the attendant turns the nut, so as to loosen collars V' V<sup>2</sup>, whereupon the gear-wheel N<sup>2</sup> runs idly on the shaft B.

The operation is as follows: When the main driving-shaft B is rotated, the warp passes over the pulley C into the tube F, which receives alternately a vibrating motion in two directions at right angles to each other. When the clutch mechanism is in the position shown in Fig. 4, the shaft N is in its extreme right-hand position, so that the clutches L and L' engage the clutches O and Q<sup>3</sup>, whereby the gear-wheels O' and Q' turn with the main driving-shaft B. The gear-wheel O' imparts a rotary motion to the gear-wheel O<sup>2</sup>, and the latter, on account of carrying the cam-wheel I, imparts a fast sidewise motion to the rod H, and the latter, on account of being connected with the tube F, swings the latter sidewise, so that the warp-thread is paid out at the lower end of the said tube F from one side to the other. At the same time the tube F is slowly moved forward by the pin P, connected with the rod P<sup>2</sup>, receiving a transverse sliding motion from the heart-shaped cam P<sup>4</sup>, slowly turned from the gear-wheel Q, in mesh with the pinion Q', engaged by the clutch L', as previously described. This rapid sidewise motion of the tube F and slow forward motion of the same pays out the warp, as shown in Fig. 7. When one layer has been made, as shown in Fig. 7, the cams S and S' have turned sufficiently to change

the position of the shaft N, so that the clutches L and L' move with the shaft N to the left and are disengaged from the clutches O and Q<sup>3</sup> and connected with the clutches K<sup>2</sup> and R, respectively. By the shifting of the clutches L and L' in this manner the above-described motion of the tube F is reversed—that is, the transverse vibrating motion will be fast, while the sidewise sliding motion will be slow. This is produced by the shifting of the clutches, which now cause the pinion K' and the gear-wheel R' to rotate, said pinion K' being connected with the gear-wheel I<sup>2</sup>, and thus slowly rotating the cam-wheel I, which imparts a slow sidewise motion to the rod H, moving the tube F slowly from one side to the other. The gear-wheel R', meshing into the pinion R<sup>2</sup>, imparts a fast rotary motion to the latter and the heart-shaped cam P<sup>4</sup>, so that a quick forward and backward sliding motion is imparted to the rod P<sup>2</sup>, which by its pin P moves the tube F rapidly forward and backward. A second layer is thus paid out on the first layer, as is plainly shown in Fig. 8, and as soon as the desired number of strands have been laid in the second layer the shaft N is again shifted by the action of the cams S S', so as to operate the rod N<sup>5</sup>, connected with the collar N<sup>3</sup> of the said shaft. By thus plaiting down the warp the latter is well adapted for baling, and will not get tangled or spoiled during the process of dyeing or sizing.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a vibrating tube or warp-guide, of mechanism for moving the tube or guide simultaneously slowly in a direction at right angles to its vibratory path, substantially as set forth.
2. The combination, in a warp-plaiting-down machine, with the warp tube or guide, of mechanism for vibrating the tube and simultaneously moving it slowly in a direction at right angles to the direction of its vibrations, and mechanism for changing the said two movements and vibrating the tube at right angles to its first vibrations and moving it simultaneously slowly at right angles to its first slow movement, substantially as set forth.
3. The combination, in a warp-plaiting-down machine, with the warp tube or guide, of mechanism for vibrating the tube and simultaneously moving it slowly in a direction at right angles to the direction of its vibrations, and an automatically-operated mechanism for changing the said two movements and vibrating the tube at right angles to its first vibrations and moving it simultaneously slowly at right angles to its first slow movement, substantially as set forth.
4. In a warp-plaiting machine, the combination, with a tube and a warp-feeding mechanism discharging the warp into the said tube, of means, substantially as described, for vibrating the tube and simultaneously mov-



ing it slowly in a direction at right angles to the direction of its vibrations, and mechanism for changing the said two movements and vibrating the tube at right angles to its first vibrations and moving it simultaneously slowly at right angles to its first slow movement, as described.

5. In a warp-plaiting machine, the combination, with a feed-pulley mounted to rotate and a tube mounted to swing in two directions at right angles to each other and into which discharges said feed-pulley, of a mechanism operated in conjunction with the said feed-pulley and serving to impart an alternate fast and slow sidewise motion to the said tube, and a mechanism operated in conjunction with the said feed-pulley and serving to impart an alternate slow and fast transversely-swinging motion to the said tube, substantially as shown and described.

6. In a warp-plaiting machine, the combination, with a feed-pulley mounted to rotate and a tube mounted to swing in two directions at right angles to each other and into which discharges said feed-pulley, of a mechanism operated in conjunction with the said feed-pulley and serving to impart an alternate fast and slow sidewise motion to the said tube, a mechanism operated in conjunction with the said feed-pulley and serving to impart an alternate slow and fast transversely-swinging motion to the said tube, and means, substantially as described, for alternately shifting said mechanisms from a fast to a slow motion, as set forth.

7. In a warp-plaiting machine, the combination, with a tube mounted to swing longitudinally and transversely, of a heart-shaped cam mounted to rotate, connections between the said cam and tube to impart to the latter a transverse swinging motion, a cam-wheel rotated simultaneously with the said heart-shaped cam, connections between the said cam-wheel and tube to impart to the latter a longitudinal swinging motion, and means, substantially as described, for rotating the said heart-shaped cam and the said cam-wheel slowly and fast alternately, as set forth.

8. In a warp-plaiting machine, the combination, with a tube mounted to swing longitudinally and transversely, of a heart-shaped cam mounted to rotate, connections between the said cam and tube to impart to the latter a transverse swinging motion, a cam-wheel rotated simultaneously with the said heart-shaped cam, connections between the said cam-wheel and tube to impart to the latter a longitudinal swinging motion, gear-wheels connected with the said heart-shaped cam and the said cam-wheel for imparting an alternate fast and slow motion thereto, and a clutch mechanism for connecting the said gear-wheels with and disconnecting them from the said heart-shaped cam and cam-wheel to reverse said motion, substantially as shown and described.

9. In a warp-plaiting machine, the combination, with a tube mounted to swing longitudinally and transversely, of a heart-shaped cam mounted to rotate, connections between the said cam and tube to impart to the latter a transverse swinging motion, a cam-wheel rotated simultaneously with the said heart-shaped cam, connections between the said cam-wheel and tube to impart to the latter a longitudinal swinging motion, gear-wheels connected with the said heart-shaped cam and the said cam-wheel for imparting an alternate fast and slow motion thereto, a clutch mechanism for connecting the said gear-wheels with and disconnecting them from the said heart-shaped cam and cam-wheel to reverse said motion, and means for shifting the said clutch mechanism, as set forth.

CLAYTON DENN.

Witnesses:

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