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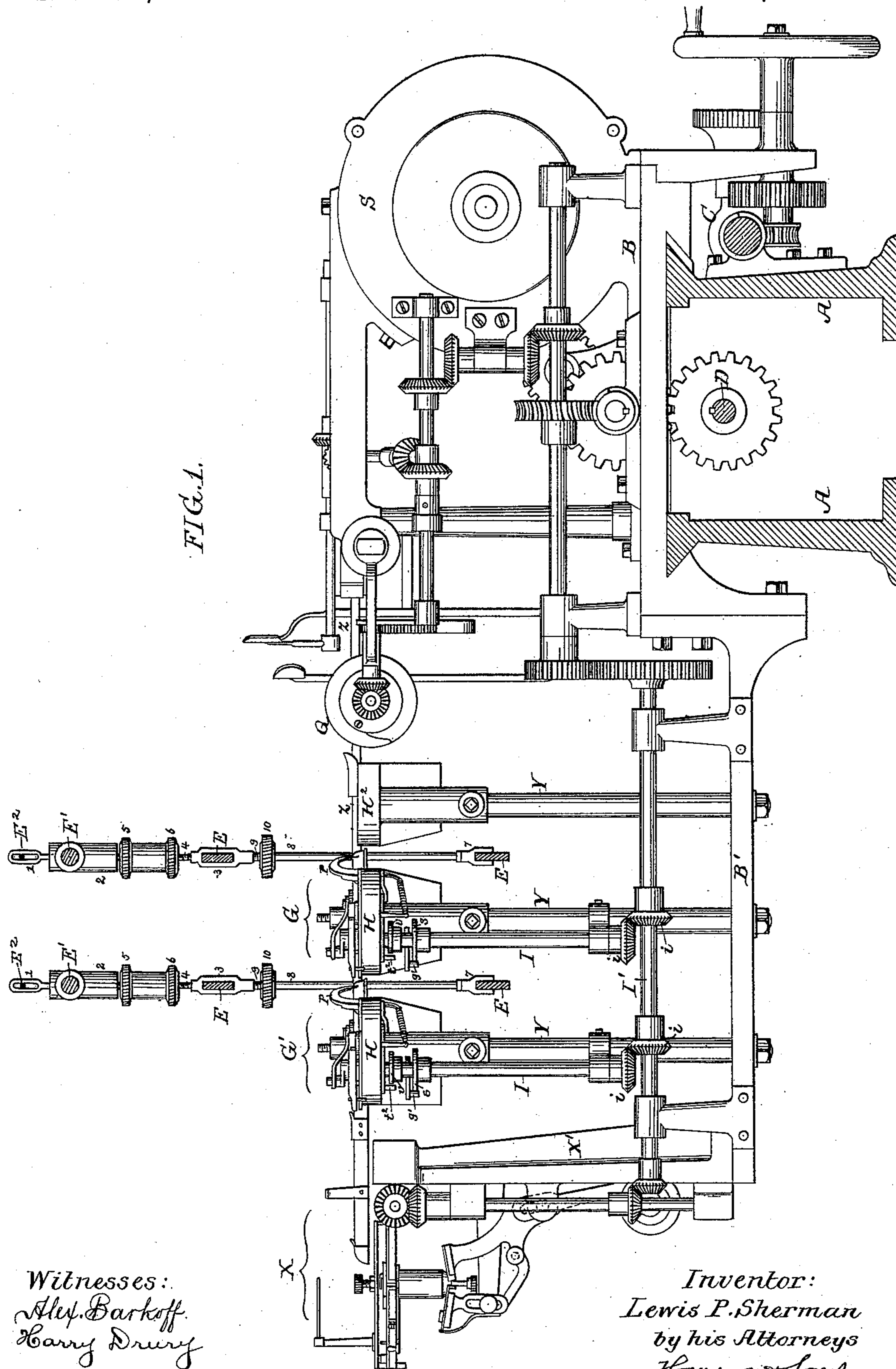
4 Sheets—Sheet 1.

L. P. SHERMAN.

MACHINE FOR DRAWING IN WARP THREADS.

No. 359,471.

Patented Mar. 15, 1887.



(No Model.)

4 Sheets—Sheet 2.

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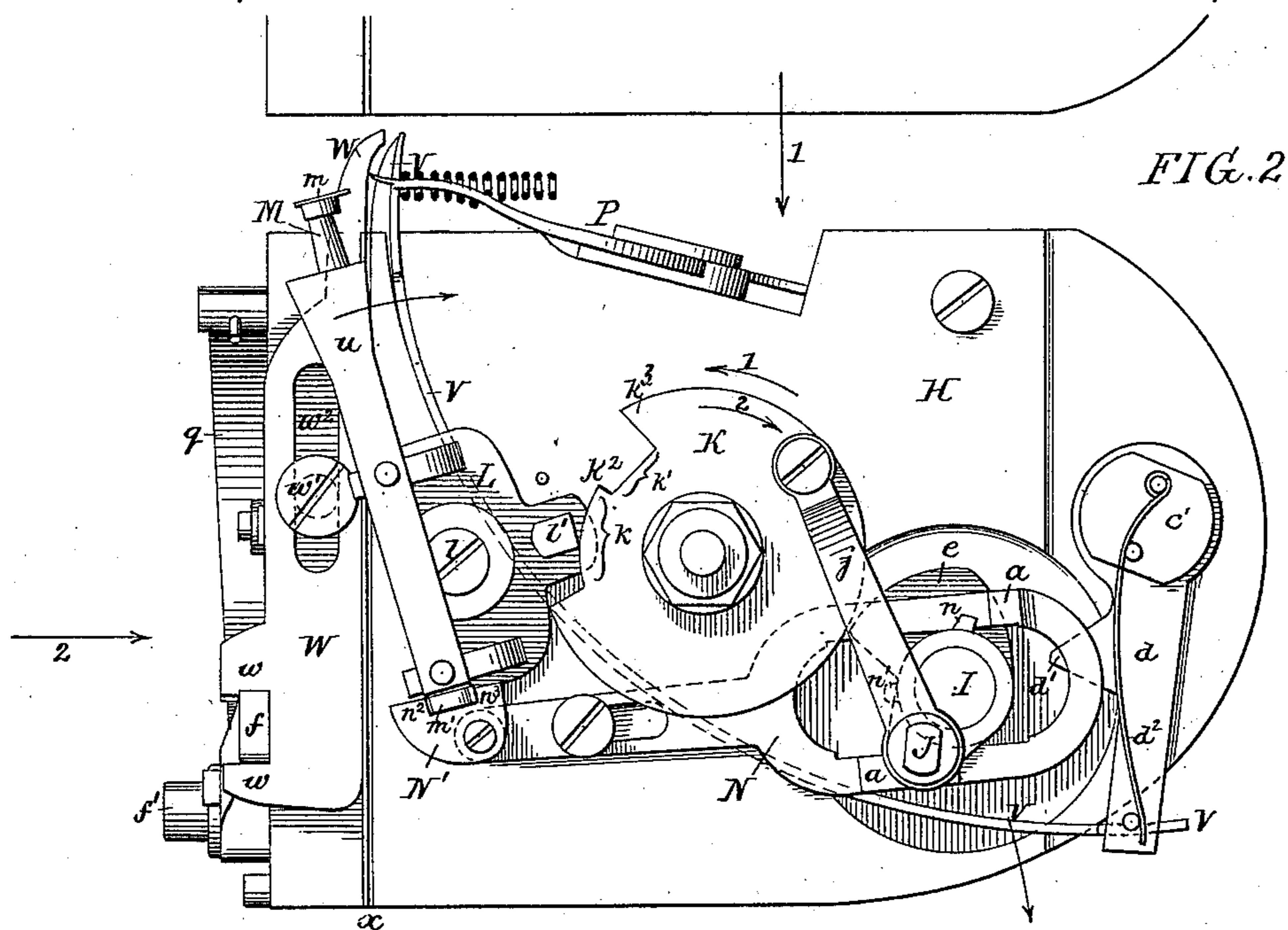


FIG. 5.

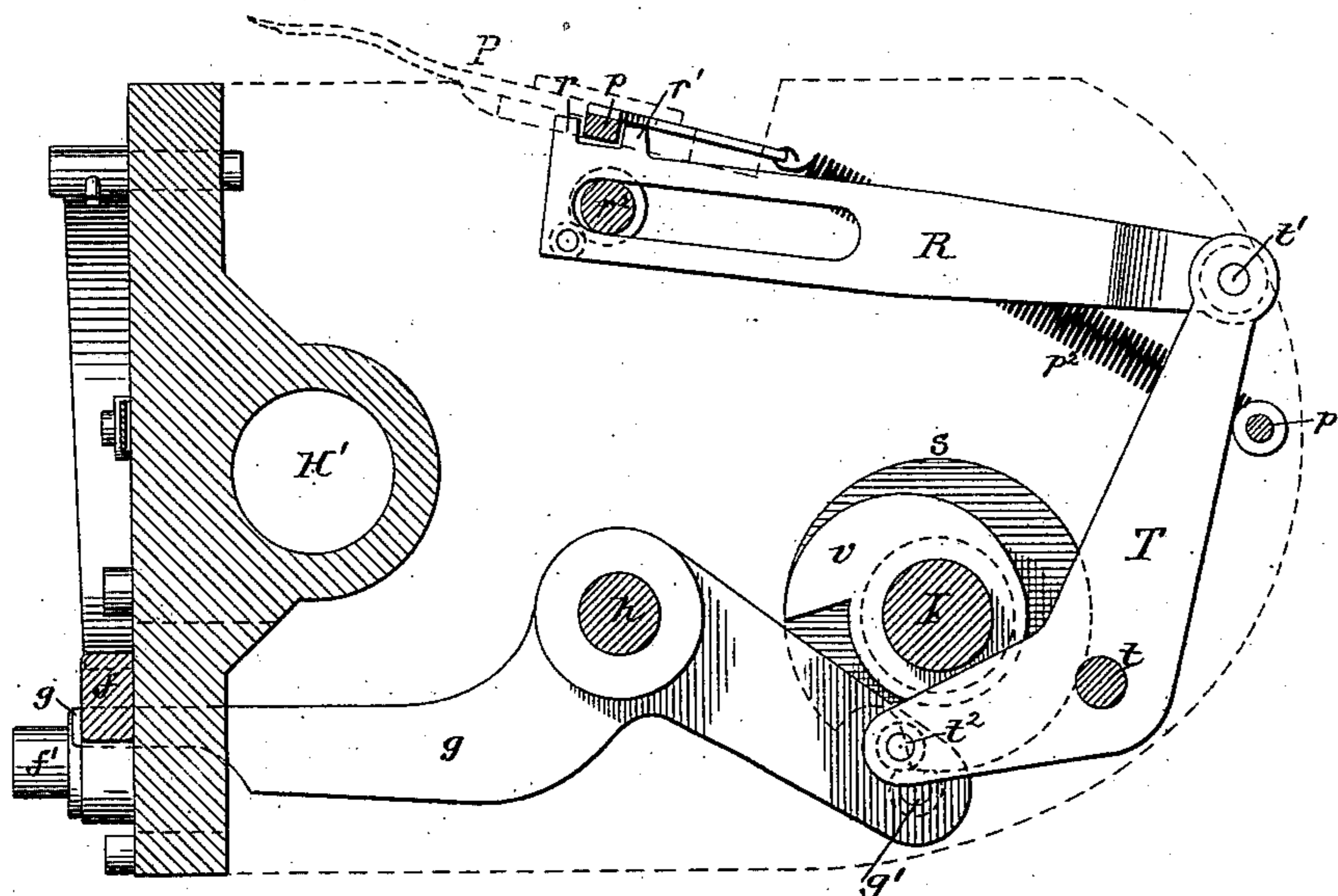
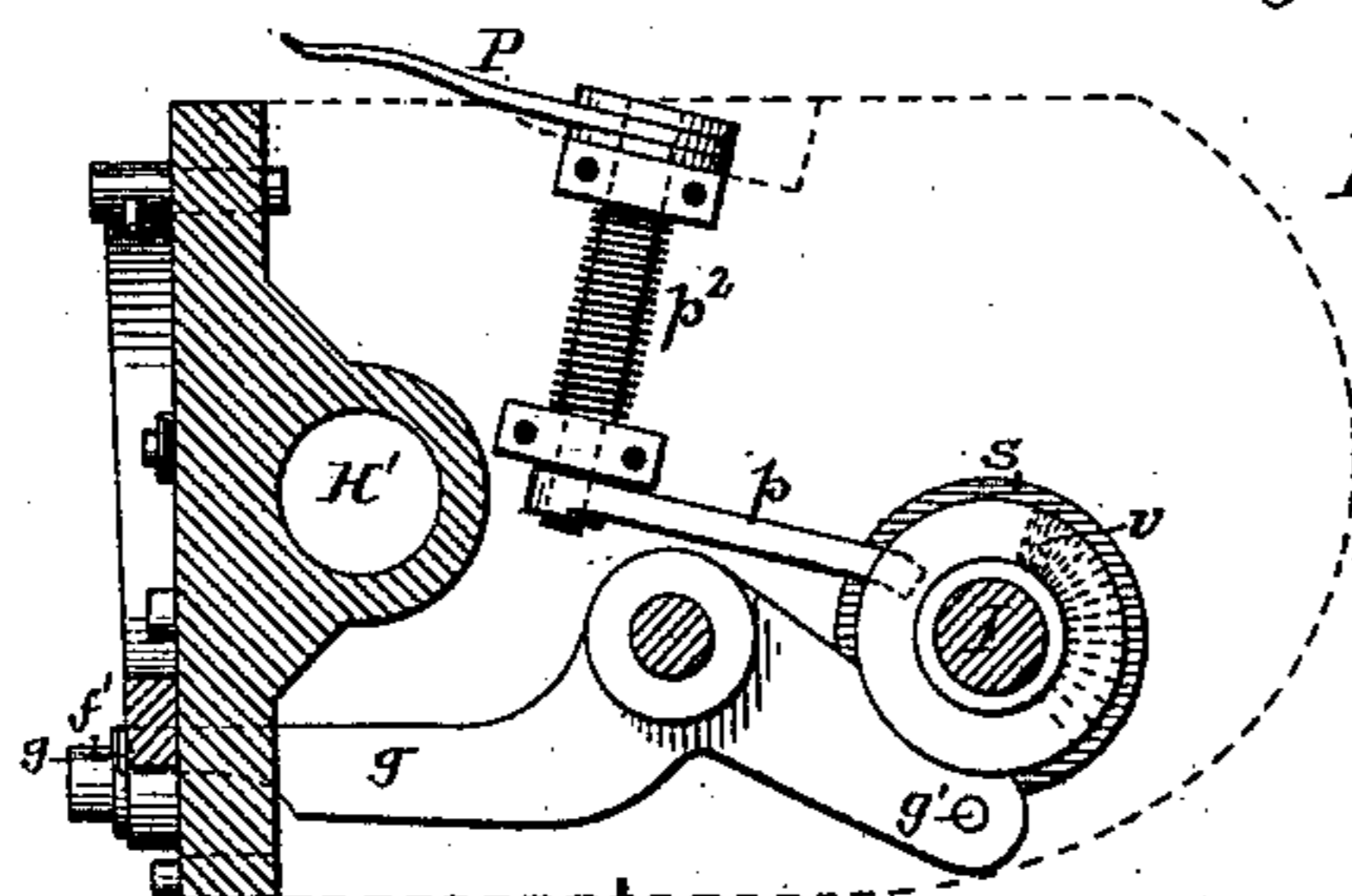


FIG. 12.



Witnesses:
Aly. Barkoff
Harry Drury

Inventor:
Lewis P. Sherman
by his Attorneys
Howson & Sons

(No Model.)

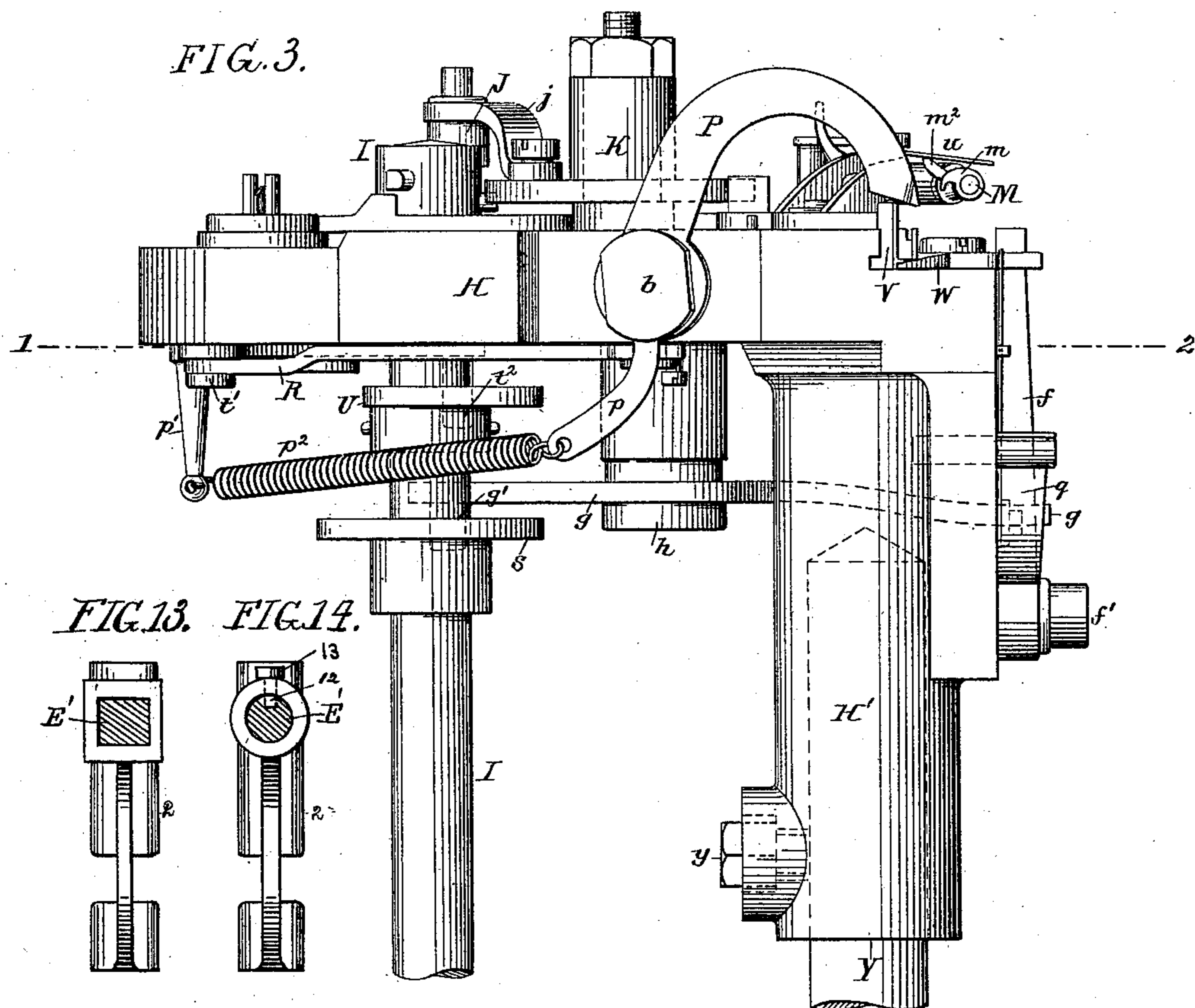
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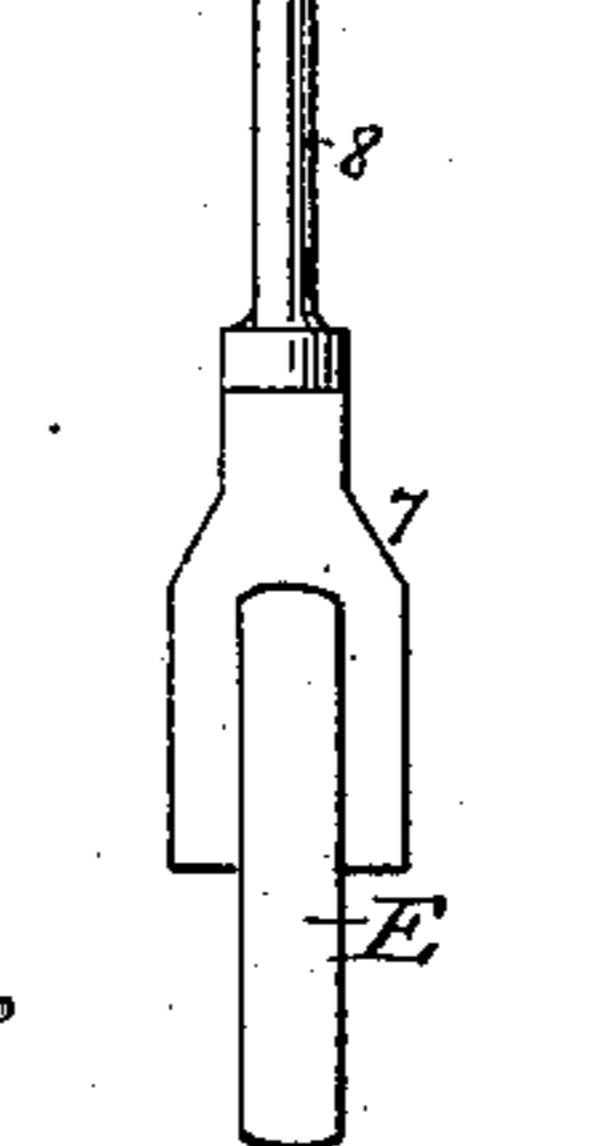
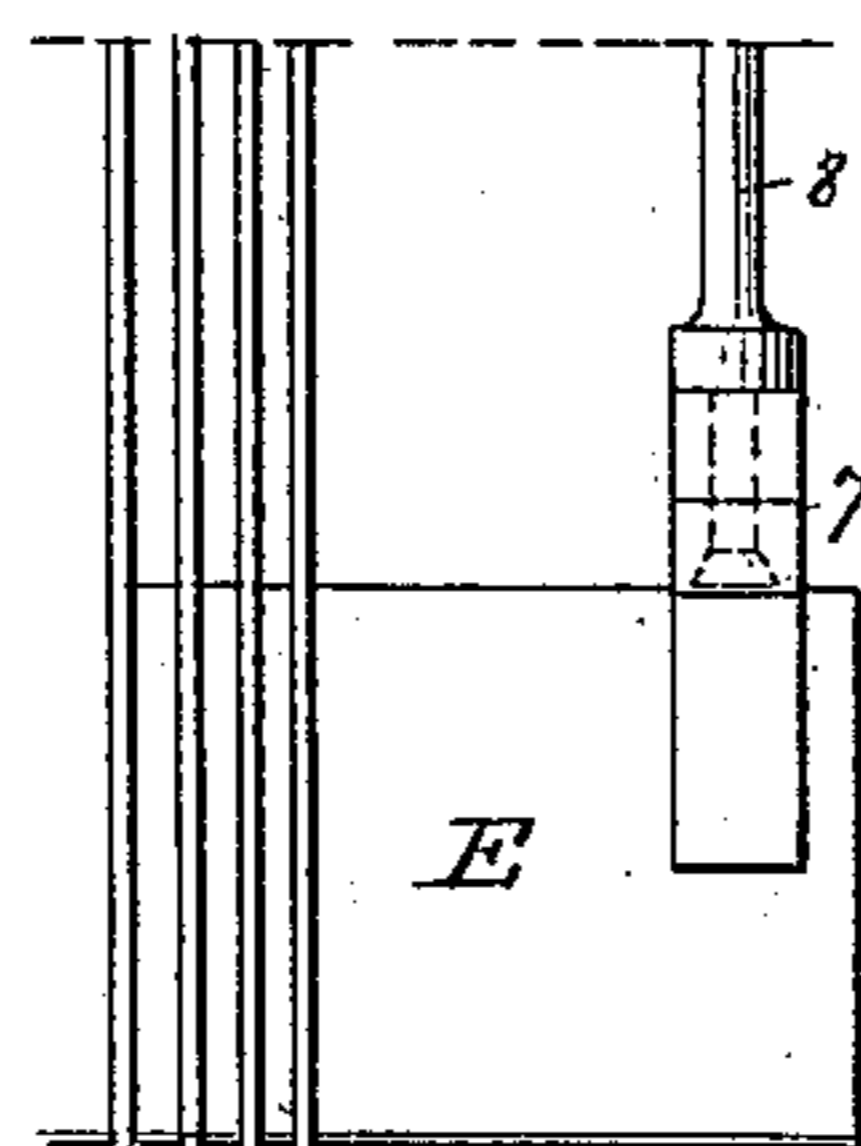
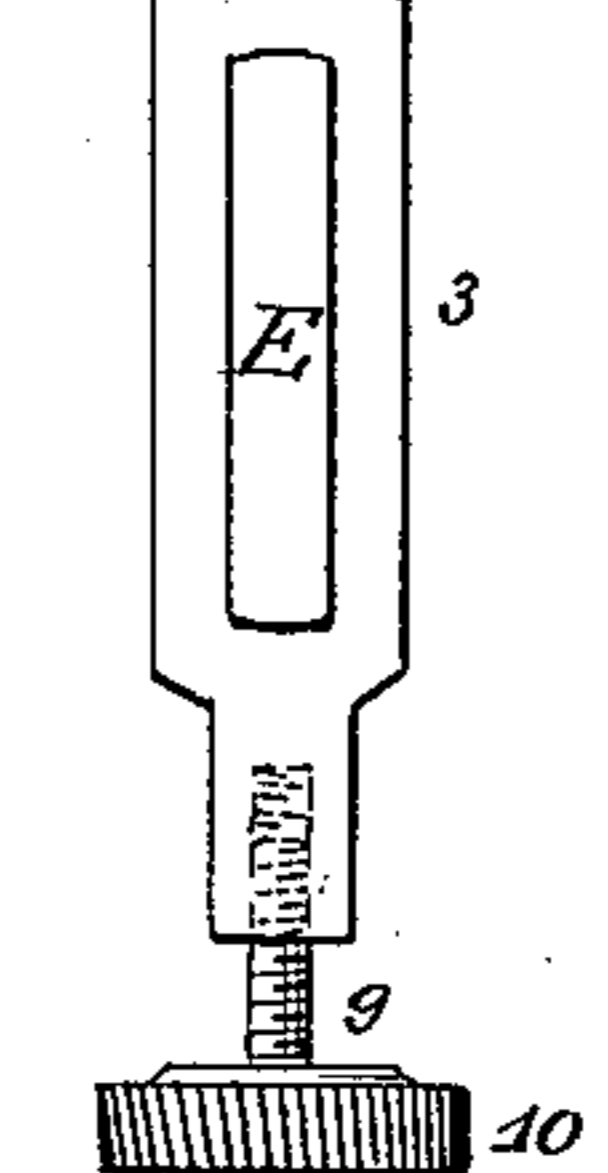
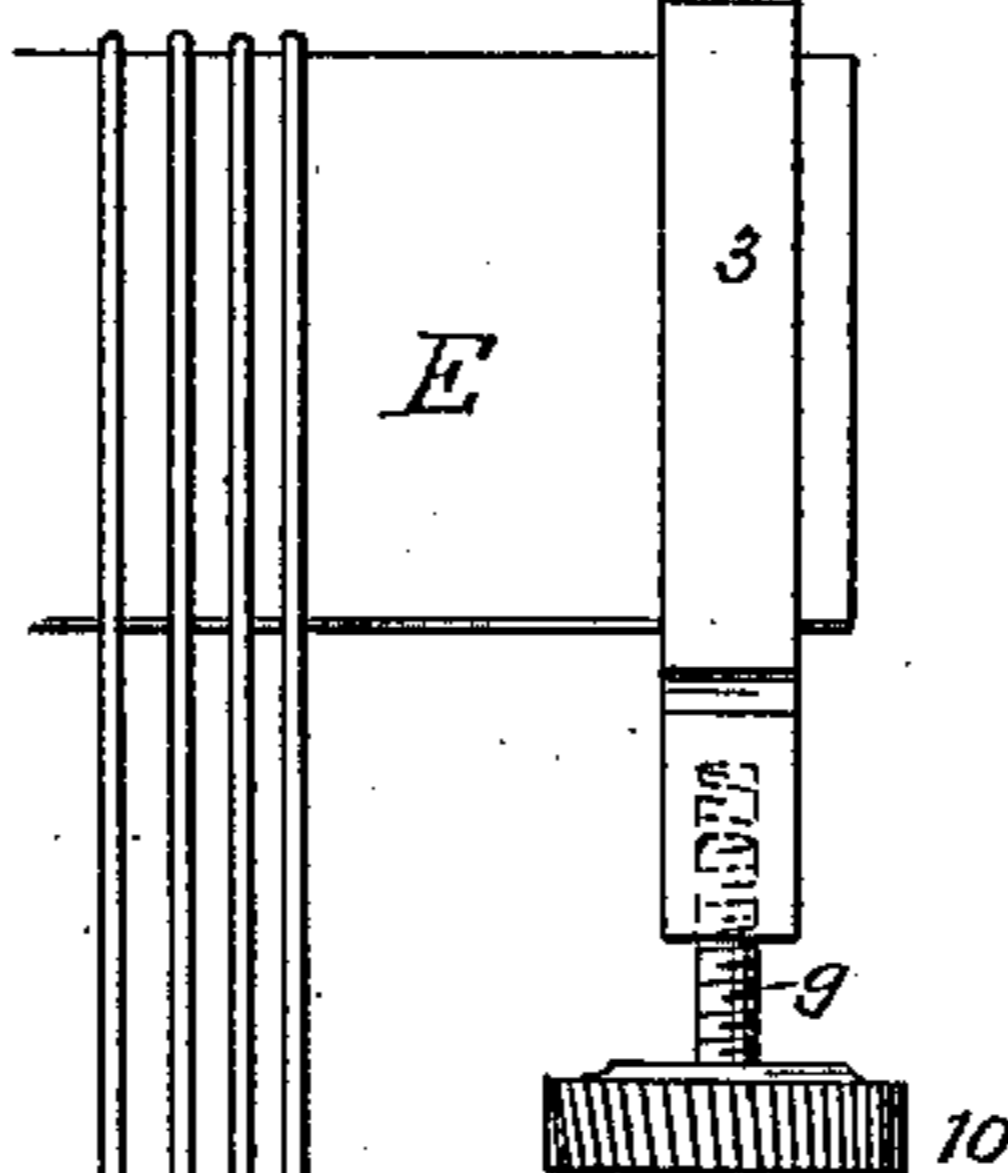
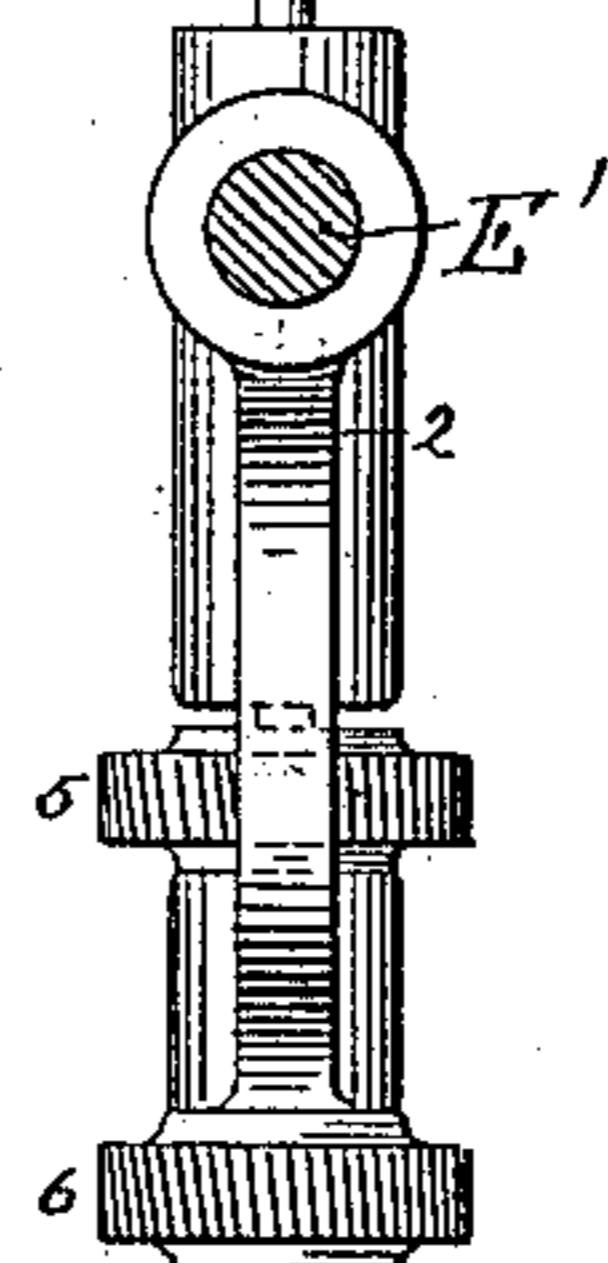
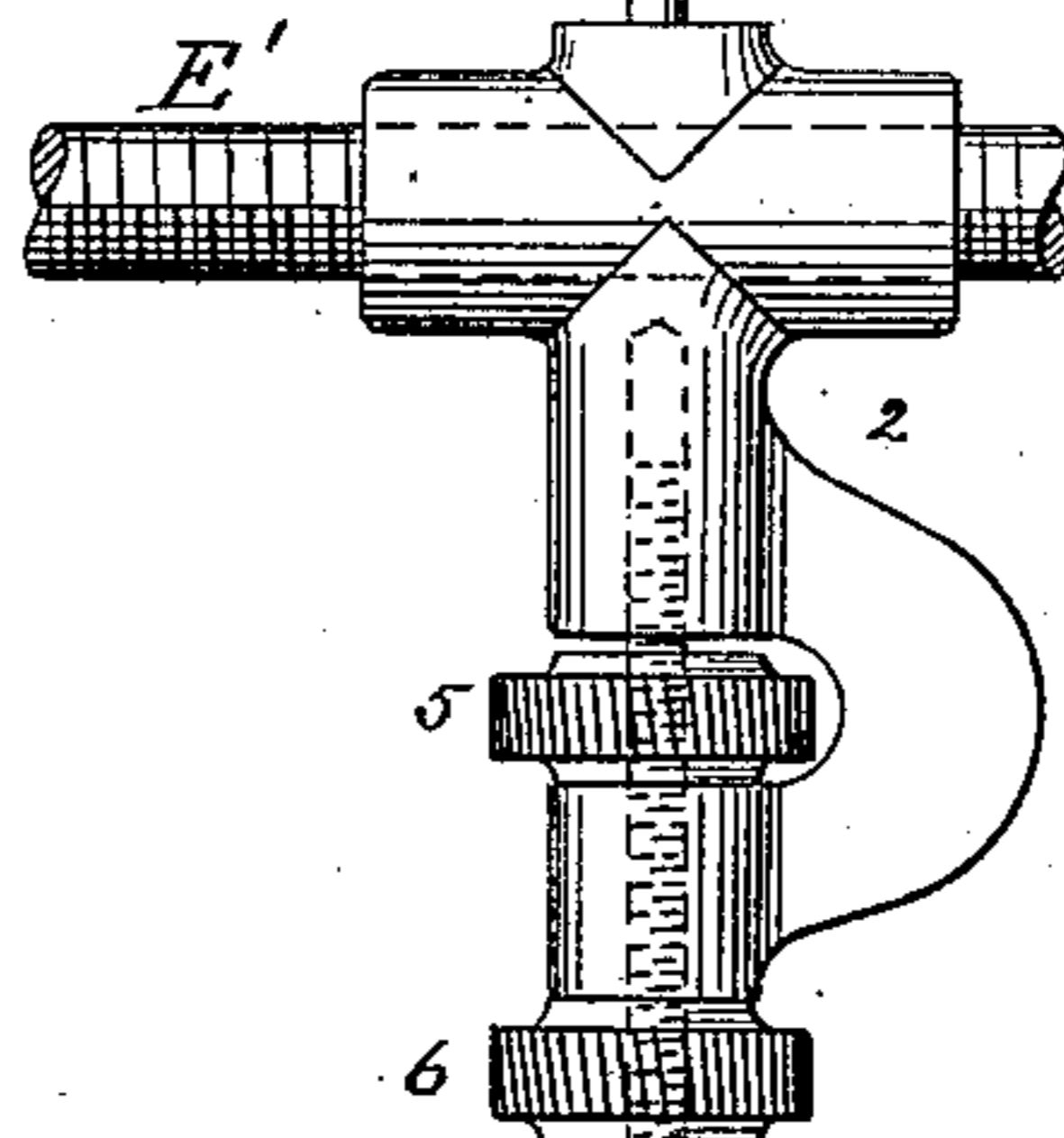
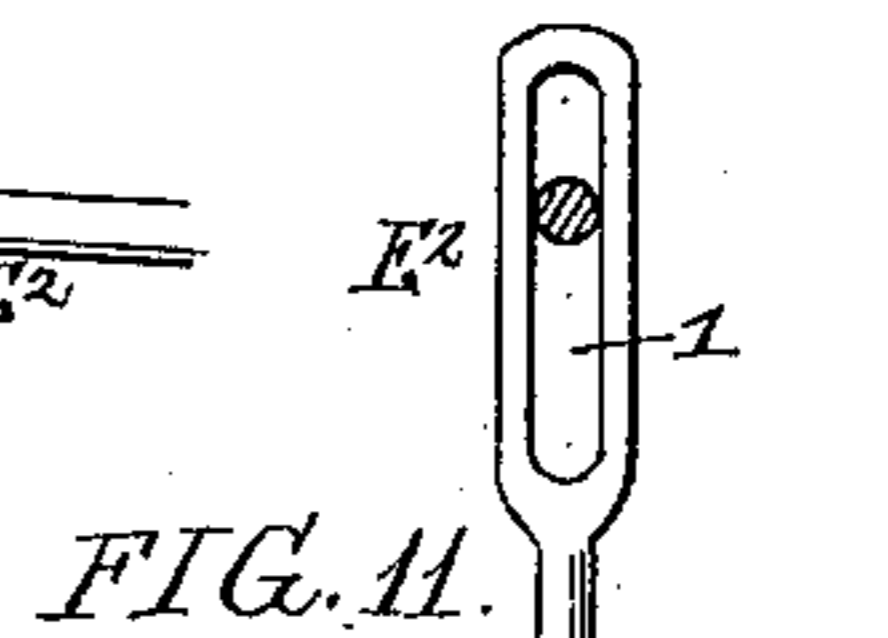
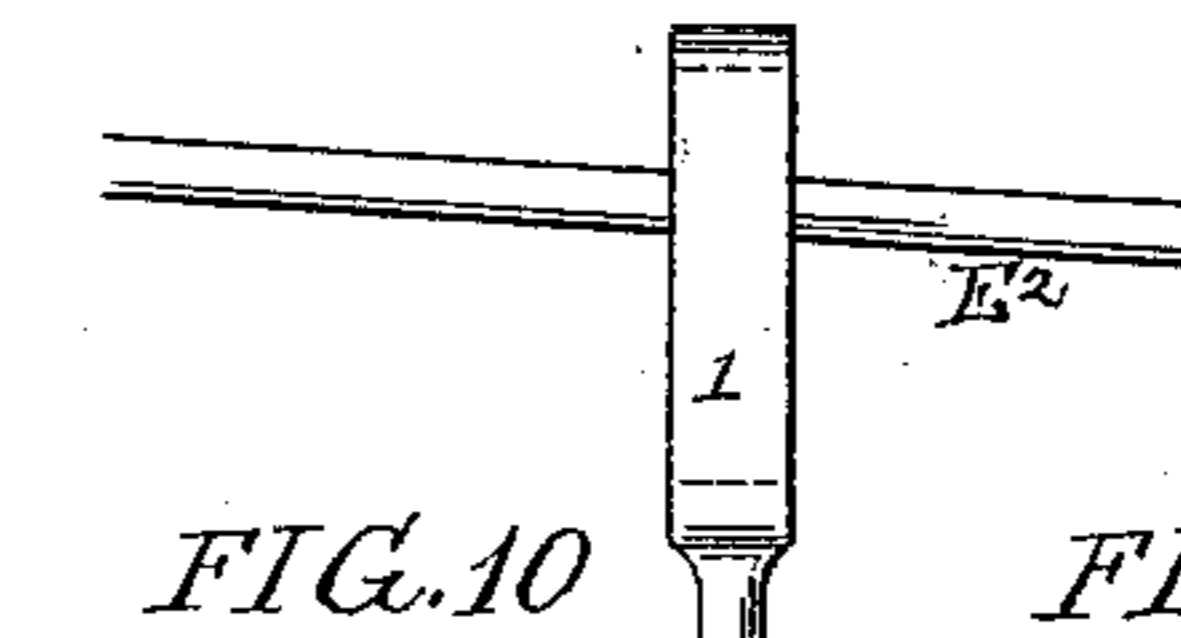
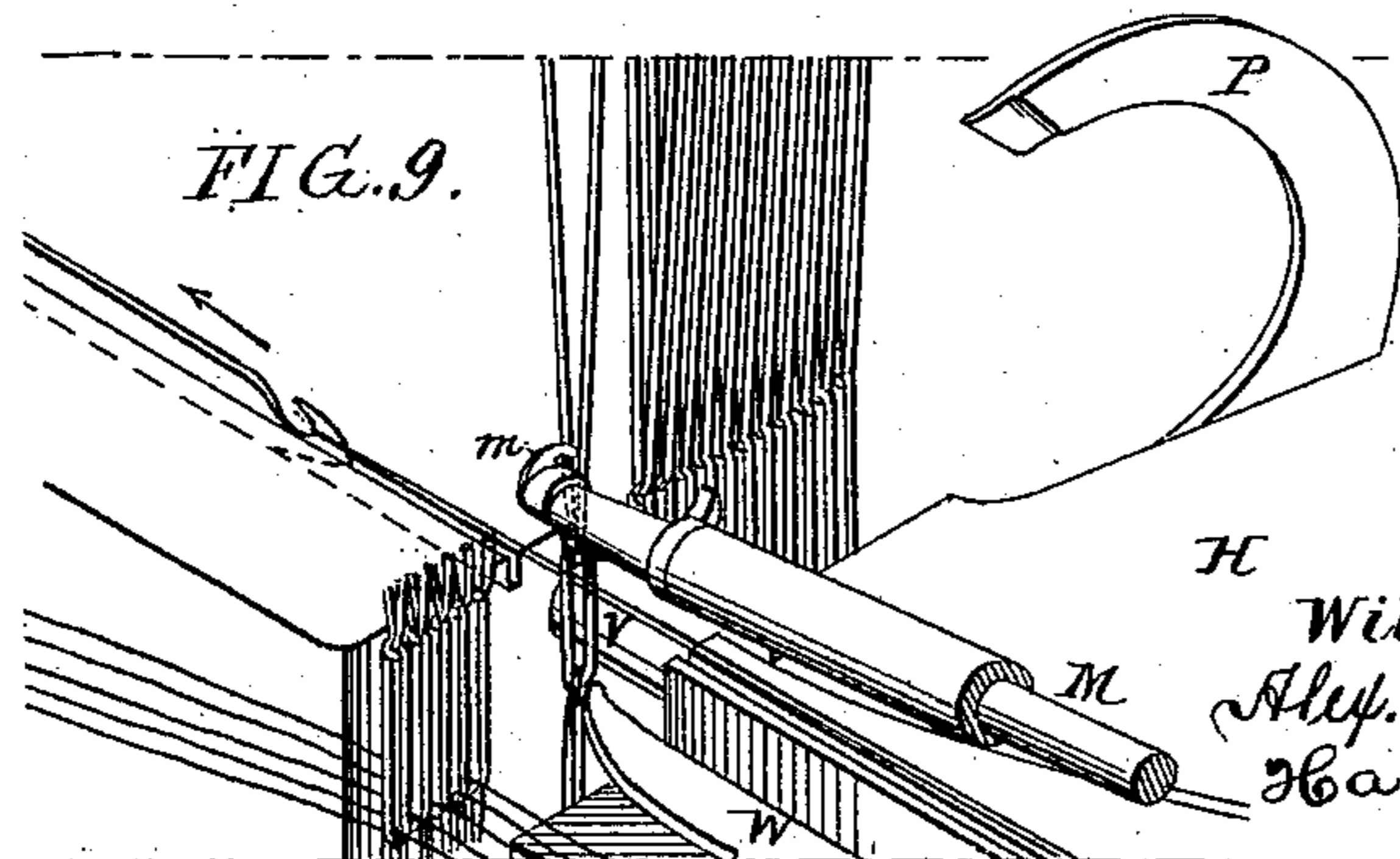
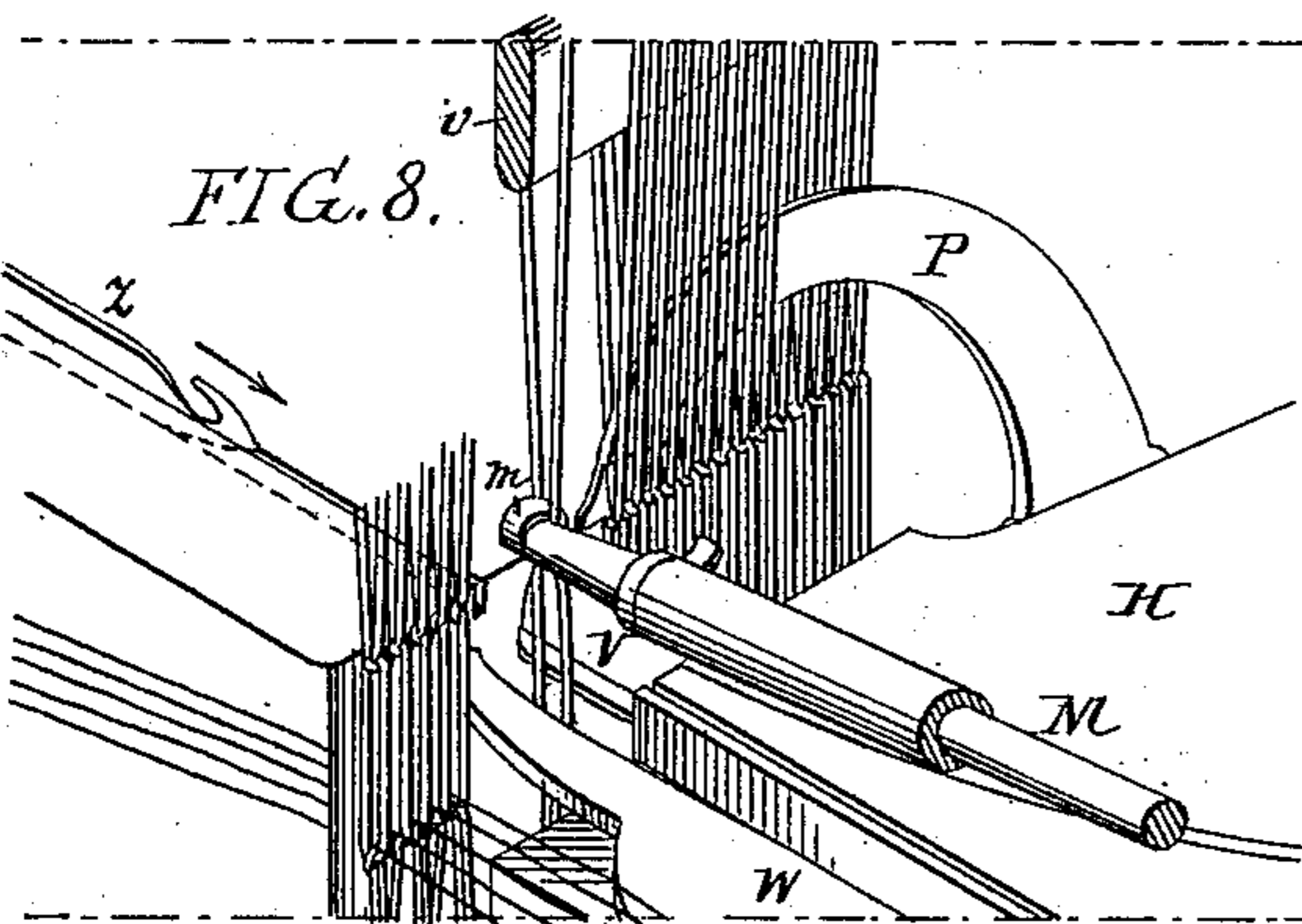
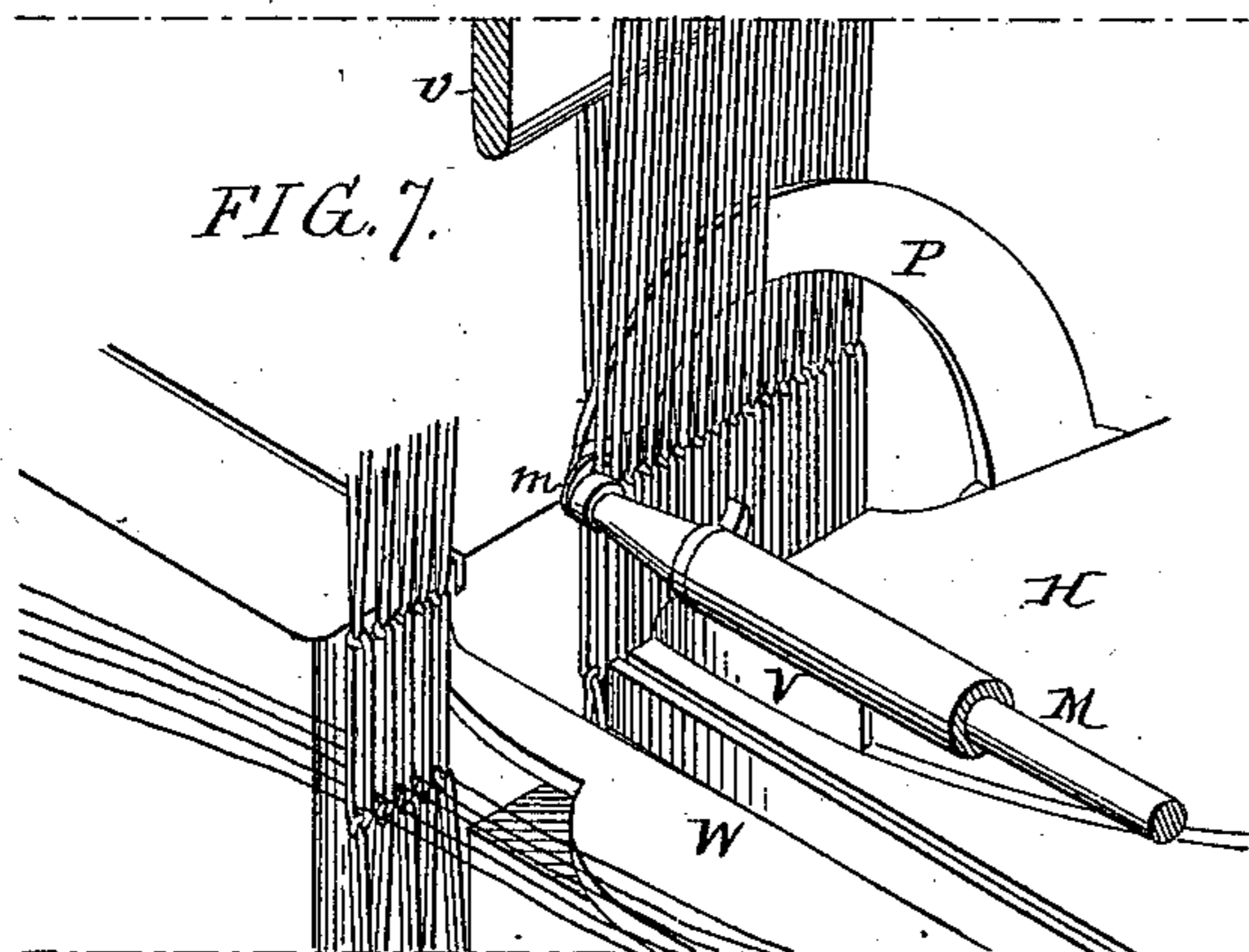
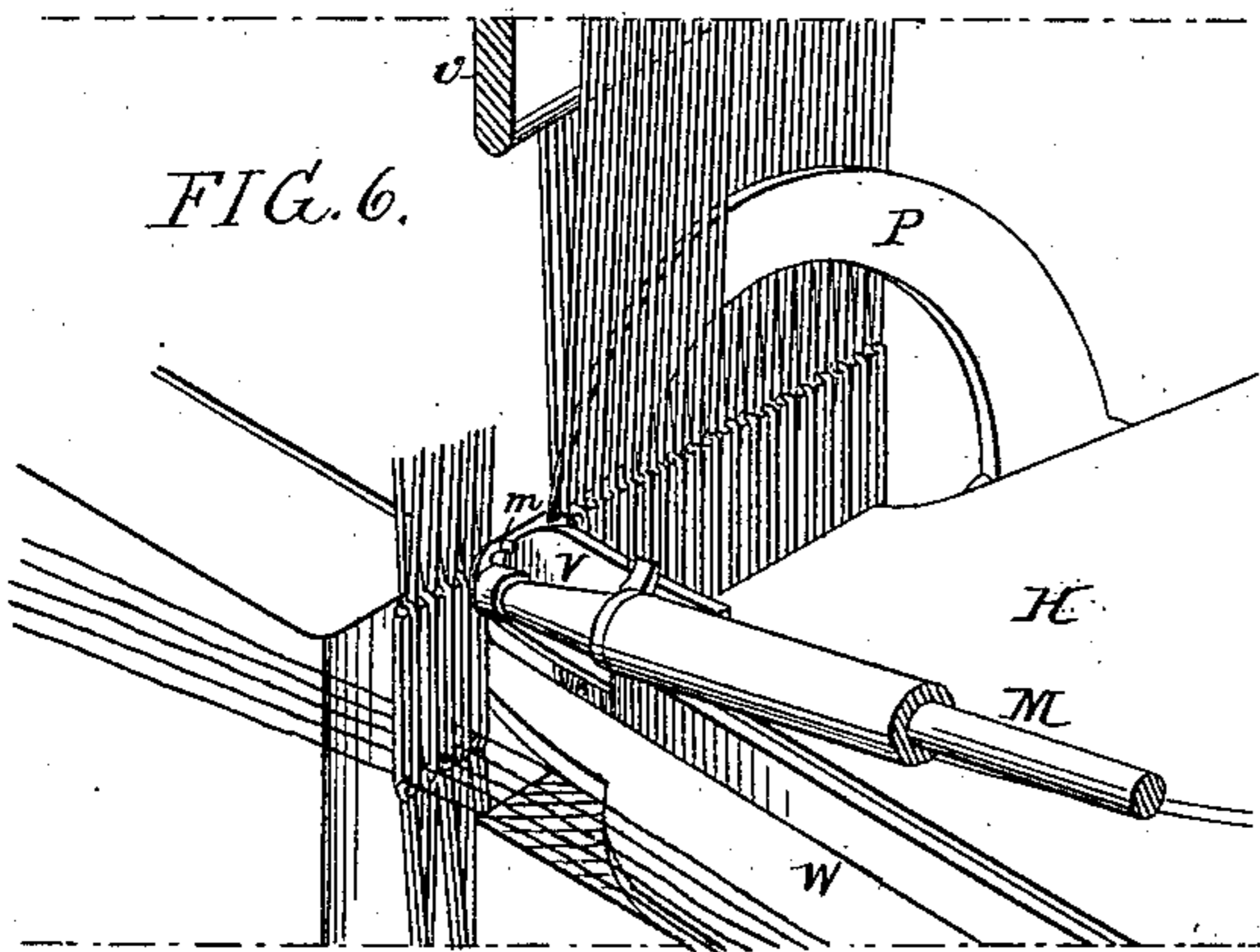
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Patented Mar. 15, 1887.



Witnesses:
Alex. Barkoff
Harry Dwyer

Inventor:
Lewis P. Sherman
by his Attorneys
Howson & Sons

UNITED STATES PATENT OFFICE.

LEWIS P. SHERMAN, OF BIDDEFORD, ASSIGNOR TO GEORGE MOORE, OF BERWICK, MAINE.

MACHINE FOR DRAWING IN WARP-THREADS.

SPECIFICATION forming part of Letters Patent No. 359,471, dated March 15, 1887.

Application filed October 29, 1886. Serial No. 217,534. (No model.)

To all whom it may concern:

Be it known that I, LEWIS P. SHERMAN, a citizen of the United States, residing at Biddeford, York county, Maine, have invented certain Improvements in Machines for Drawing in Warp-Threads, of which the following is a specification.

My invention consists of certain improvements in the machines for drawing in warp-threads illustrated in Patents No. 255,038, dated March 14, 1882; No. 282,124, dated July 31, 1883, and No. 355,221, dated December 28, 1886.

My improvements relate to the heddle-separating mechanism and heddle-holding devices, the objects of the improvements being to render the heddle-separating mechanism simple and compact in construction and accurate in operation, and to provide rigid but readily adjustable hangers for supporting the heddles.

In the accompanying drawings I have shown sufficient of a warp-drawing machine to illustrate my invention.

Figure 1 is a view of the machine with my improvements, the view being partly in section, but mainly in side elevation. Fig. 2 is a plan view, on a larger scale, of the heddle-separating device. Fig. 3 is a front view of the same, looking in the direction of the arrow 1, Fig. 2. Fig. 4 is a side view looking in the direction of the arrow 2, Fig. 2. Fig. 5 is a sectional plan view on the line 1 2, Fig. 3. Figs. 6, 7, 8, and 9 are perspective diagrams illustrating the operation of the heddle-separator. Figs. 10 and 11 are respectively front and side views of one of the heddle-hangers, with part of a heddle and part of the supporting-rod; and Fig. 12 is a sectional plan view of the heddle-separator, showing a modification of part of the same. Figs. 13 and 14 are views of modifications of the heddle-supporting devices.

All parts of the machine are similar in general construction and operation to the machine shown in the above-mentioned Patent No. 355,221, with the exception of the heddle-separating devices and heddle-holders, and in the side view of the machine shown in Fig. 1, A is the bed of the machine, B the carriage or slide, C the feed-screw, D the driving-

shaft, B' the bracket for the standards Y of the heddle-separating devices and the standard X' of the thread-selector X, S the casing containing the needle *z*, and Q the reed-dent separator, all of these devices being driven from the shaft D through the medium of suitable gearing. E E are the frames of the heddles, E' E' the heddle-supporting bars, and G G' are heddle-eye-separating devices constructed in accordance with my invention.

As in the machine shown in the aforesaid application, two heddles are shown and two separate and distinct heddle-eye separators—that is to say, devices for picking out the eye, holding it in place while it is being threaded, releasing the eye, and moving it away from the path of the needle, the two devices being so timed that on one movement the needle will pass through the eye of one heddle and between the eyes of the second heddle, and after taking a thread from the thread-selector X will pull it through the eye of the first heddle, while on the second movement the needle will pass between the eyes of the first heddle and through an eye in the second heddle, and after taking another thread will draw it through the eye of the second heddle, as will be readily understood on referring to the application above noted.

The two heddle-eye-separating devices are similar to each other, and therefore I will only describe one of them.

Referring to Figs. 2, 3, 4, and 5, which are enlarged views of the heddle-eye-separating device, H is a bracket having a tubular extension, H', into which is fitted the post Y of the bracket B', the two parts being secured together by a set-screw, *y*, Fig. 3.

I is the driving-shaft, which is geared to the counter-shaft I' by bevel-gears *i i*, Fig. 1, said shaft I' being connected by a suitable train of gearing to the main shaft of the machine. On the upper portion of this shaft I is a crank-arm, J, which is connected to a vibrating disk, K, by a rod, *j*, Fig. 2.

Pivoted to a pin, *l*, on the bracket H is a block, L, having bearings for a spindle, M, which has at its outer end a hook, *m*, of the shape shown in Fig. 3, the function of this hook being to pick out a heddle-eye, draw it

over into the path of the needle, and then release it. Part of the movement of the hook is due to the action of the disk K upon the block L, another part of the movement being effected by tappets n n' , which project from the shaft I and act upon lugs a a on a sliding yoke-bar, N, Fig. 2, the latter having a plate, N', with lugs n^2 n^3 , which act upon an arm, m' , at the rear end of the spindle M.

The disk K has a shallow notch, k , and a deep notch, k' , and a lug, l' , on the block L is acted upon by the shoulders k^2 k^3 , formed by the recesses k k' , so that said block is vibrated on every revolution of the shaft I and vibration of the disk K, the spindle M having a movement on its own axis besides that due to the vibration of the block L. A spring, u , secured to the top of the bearings on the block L, bears upon a pin, m^2 , on the spindle M, and tends to maintain the hook m either in the elevated or depressed position. As the disk K vibrates in the direction of the arrow 1, Fig. 2, the spindle M remains in its retracted position until the lug l' is struck by the shoulder k^3 , whereupon the block L is vibrated and the spindle and its hook are carried forward. On the rearward vibration of the disk K, as shown by the arrow 2, the lug l' is struck by the shoulder k^2 , and the spindle M is retracted and retained in this position, the lug l' traversing the shallow portion k of the slot in the disk. The movements of the yoke-bar N and disk K are so timed that the hook m is moved in the direction of the arrow, Fig. 2, until it is in position to engage with one of the heddle-eyes, the hook being then lowered so as to engage with the eye, and then retracted so as to bring it into the path of the needle, the hook being finally elevated, so as to clear the eye and assume its normal position, as in Fig. 2.

P is a finger for holding the heddle-eyes in line for the action of the hook m , this finger vibrating in a plane inclined in respect to the plane of the heddle, so that it will pass between the looped threads at a point several eyes in the rear of the one to be taken up, as shown in any of the diagrams, Figs. 6 to 9. The finger P is pivoted to the bracket H by a pin, b , and has an arm, p , connected to a post, p' , by a spring, p^2 , which tends to keep the finger in the position shown in Fig. 3, so that it will rest on a series of heddle-eyes, as in Figs. 6 to 9.

On the under side of the bracket H, as shown in Fig. 5, is a sliding bar, R, having two lugs, r r' , which embrace the arm p , said arm R being slotted for the reception of a guide-pin, r^2 , secured to the under side of the bracket H.

Connected at t' to the bar R is a lever, T, pivoted at t , and having a pin, t^2 , which is acted on by a cam, v , on the shaft l , the peculiar shape of this cam v being best observed in Fig. 5, so that once in every revolution of the shaft l the finger P is thrown up, as shown in Fig. 9, but is soon released and permitted to again assume its normal position, as shown in

Fig. 6, so as to press upon the series of heddle-eyes.

Fingers V W hold the heddle-eye in position while the needle is passing through the eye, and these fingers are operated by cams on the shaft I. The finger V is adapted to a segmental slot in the bracket H, (see Fig. 2,) the rear end of the finger being connected to an arm, d , pivoted at c' to the under side of the bracket H, and having a projection, d' , which is acted upon by a cam, e , on the shaft I, this cam being such that it will withdraw the finger V out of the path of the heddle-eye when the hook m has engaged therewith and is carrying the heddle-eye into the path of the needle, the finger, as soon as released from the control of the cam, being returned to its normal or projected position by means of a spring, d^2 , so that the eye is held between the two fingers W and V. The finger W slides on a depressed portion of the bracket H, and is held in place by a screw, w' , which passes through a slot, w^2 , in the finger. (See Fig. 2.) The finger W has two projections, w w , which embrace the end of an arm, f , pivoted at f' to the sides of the bracket H, Fig. 4.

Pivoted to the under side of the bracket H, at h , is a lever, G, one arm, g , of which enters a slot in the arm f , the other arm having a pin, g' , which is acted upon by a cam, s , on the shaft I. This cam s is simply a notched disk, the character of the notch being such that the finger W will remain in its normal or projected position throughout almost the entire revolution of the shaft I, but will at the proper time be retracted under the action of a spring, q , so as to allow the threaded eye to pass to one side clear of the path of the needle, the finger W being then returned immediately to its normal position by the action of the cam s .

A bracket, H^2 , is secured to one of the standards Y, and forms, with the forward bracket, H, a channel for the guidance of the first heddle E, a similar guiding-channel for the second heddle being formed by the rear edge of the bracket H, and the bracket of the second heddle-eye-separating device G', as shown in Fig. 1.

The needle, which is of the flat form shown in the aforesaid patent, is guided in each one of the brackets by a slot, x .

The devices for holding the heddle in position in the machine are shown in Figs. 10 and 11, and consist of hangers hung to a bar, E', which is preferably screw-threaded, and has a guide-bar, E², above it for engaging with a slotted extension, 1, on the hanger 2, and keeping the latter perfectly steady. In some cases the bar E' need not be threaded, as it may be square, as in Fig. 13, or may have a keyway, 12, as in Fig. 14, which will serve the same purpose as the additional bar, E². In that case I prefer to use a set-screw, 13, or similar device, to prevent the hanger from moving laterally.

A yoke, 3, which is of such a size as to slip over the end of the upper heddle-bar E, has

a threaded extension, 4, which passes up through the hanger, as shown by dotted lines in Fig. 10. A thumb-nut, 5, adapted to a recess in the hanger, serves to raise and lower this yoke 3, and a jam-nut, 6, secures the yoke in position when once adjusted.

A block, 7, is slotted to receive the end of the lower heddle-bar E, and has attached to it a swiveled bar, 8, having at its upper end a screw-thread, 9, which is tapped into the lower end of the yoke 3. This bar has an enlargement, 10, forming a thumb-screw, whereby the bar can be turned, so as to separate the upper and lower bars of the heddle and take up the slack of the heddle-cords between the two bars, or release the bars from pressure and slacken the cords. It will thus be seen that the bar 8 forms a strut between the two bars of the heddle, thus providing a perfectly rigid support for the heddle without the aid of the usual lower frame.

The bar E need not necessarily be at the top, as it may in some cases be at the bottom, the whole structure, when tension is applied, being stiff enough to sustain itself.

I will now describe the operation of the heddle-eye-separating device.

The heddles are supported in a position the reverse of those in the machine shown in my Patent No. 355,221—that is to say, so that the looped portions of the heddle-cords are uppermost, as will be observed in Fig. 6, and I prefer to separate these looped portions of the heddle-cords by a bar, *v*, Fig. 6, so that the finger P in traversing its inclined path will be sure to enter the looped cords and not pass clear through the heddle from side to side.

The finger P is reduced near the end, as shown, in order that the hook *m* may pass between the same and the heddle-cord when it turns to select a heddle-eye. As shown in Fig. 6, the finger P is resting on five or six heddle-eyes, which are held back by the finger V, the hook *m* being at rest away from the heddle and in its elevated position, having just moved a heddle-eye out of the path of the needle. The finger V being retracted, as shown in Fig. 7, the hook is moved over and turned down, so as to engage with an unthreaded eye, as shown in Fig. 7, the hook then swinging back so as to draw the selected eye into the path of the needle, the finger W stopping it in the right position—that is, in line with the needle. The finger V is then forced out, as shown in Fig. 8, so that the heddle-eye is firmly confined, and the needle *z* passes through the eye thus held, takes a thread from the selector X, and draws it through the eye. The hook *m* having been previously raised so as to release the heddle-eye, the finger W is retracted so as to release the newly-threaded eye of the heddle, and is then again projected, the rounded point of the finger W enabling it to push the newly-threaded eye to one side clear of the path of the needle, and preventing it from resuming its former position, as shown in Fig.

6. The operations are then repeated until every eye of the heddle is threaded.

The finger P is vibrated on each threading operation, so that it will be free from engagement with the heddle for a certain length of time, and will thus permit the necessary feed movement of the carriage and the heddle-eye-separating and thread-selecting devices carried thereby.

The main features of novelty in the heddle-eye-separating mechanism which I have shown are the separating-hook, the retaining and clamping fingers V and W, and the finger P, for lining up the eyes for the action of the hook; and the mechanism for operating these parts may be modified in various ways without departing from my invention. In Fig. 12, for instance, I have shown a modified plan of operating the finger P, said finger being secured to a rock-shaft, which is acted upon by a spring, *p*², and has an arm, *p*, under the direct control of a face-cam, *v*, on the shaft I.

I claim as my invention—

1. The combination of a heddle-support and a threading-needle with a hook adapted to engage with a heddle-eye, and with means for vibrating said hook, whereby the eye is separated from the others and drawn into the path of the needle, all substantially as specified.

2. The combination of a heddle-support and a threading-needle with the eye-separating hook and means for imparting to said hook a rocking movement on its own axis and a vibrating movement independent thereof, all substantially as specified.

3. The combination of the heddle-support with a presser-finger bearing upon the ends of the heddle-eyes and serving to hold the same in position, all substantially as specified.

4. The combination of the heddle-support with a presser-finger projecting into the loops of the heddle-cords and bearing upon the ends of the eyes and with means for vibrating said finger, all substantially as specified.

5. The combination of a heddle-support, a threading-needle, a finger engaging with the heddle-cords and keeping the eyes in line, a hook whereby the heddle-eyes are separated, and means for vibrating said hook, all substantially as specified.

6. The combination of the heddle-support, the threading-needle, the eye-separating hook and its vibrating mechanism, a finger whereby the mass of unthreaded heddle-eyes is held back out of the path of the needle, and means for moving said finger into and out of its retaining position, all substantially as specified.

7. The combination of the heddle-support, the threading-needle, the eye-separating hook and its vibrating mechanism, a finger whereby the threaded eyes are held out of the path of the needle, and means for moving said finger into and out of operative position, all substantially as specified.

8. The combination of the heddle-support, the threading-needle, the eye-separating hook

- and its vibrating mechanism, fingers whereby the masses of unthreaded and threaded eyes are held out of the path of the needle and the eye to be threaded is held in the path of said needle, and means for operating said fingers, whereby the threaded eye is pushed out of the way and the separating-hook permitted to draw a fresh eye into the needle-path, all substantially as specified.
9. The combination of the heddle-support, the finger P and its operating mechanism, and a bar whereby the looped cords of the heddle are distended for the entrance of said finger, all substantially as specified.
10. The combination of the heddle-support, the eye-separating hook, and the finger P, having a reduced end, whereby the engagement of the hook with the heddle-eye is facilitated, all substantially as specified.
11. The combination of the eye-separating hook and its spindle with a pivoted block having bearings in which said spindle is free to rock, all substantially as specified.
12. The combination of the heddle-separating hook and its spindle, the pivoted block carrying said spindle and having a projecting lug, a disk having shoulders of different heights for acting on said lug, and means for vibrating said disk, all substantially as specified.
13. The combination of the heddle separating hook and its spindle, having an arm, a block carrying said spindle, means for vibrating said block, a yoke-bar engaging with the spindle-arm, and means for reciprocating said yoke-bar, all substantially as specified.
14. The combination of the heddle-retaining finger, the bracket having a segmental guide therefor, the arm connected to the finger, and means for vibrating said arm, all substantially as specified.
15. The combination of the heddle-supporting bar, the hanger thereon, having an eye for one of the bars of the heddle, and a rod bearing against the other bar and forming a strut between the two, all substantially as specified.
16. The combination of the heddle-supporting bar, the hanger having an eye for one of the heddle-bars and a strut for the other bar, and means for adjusting said eye on the hanger, all substantially as specified.
17. The combination of the heddle-supporting bar, the hanger having an eye for one of the heddle-bars, a strut-rod bearing against the other heddle-bar, and means for adjusting the length of said rod, all substantially as specified.
- In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.
- LEWIS P. SHERMAN.
- Witnesses:
 ORRIN Q. SHUPLEIGH,
 JOHN C. HURD.