

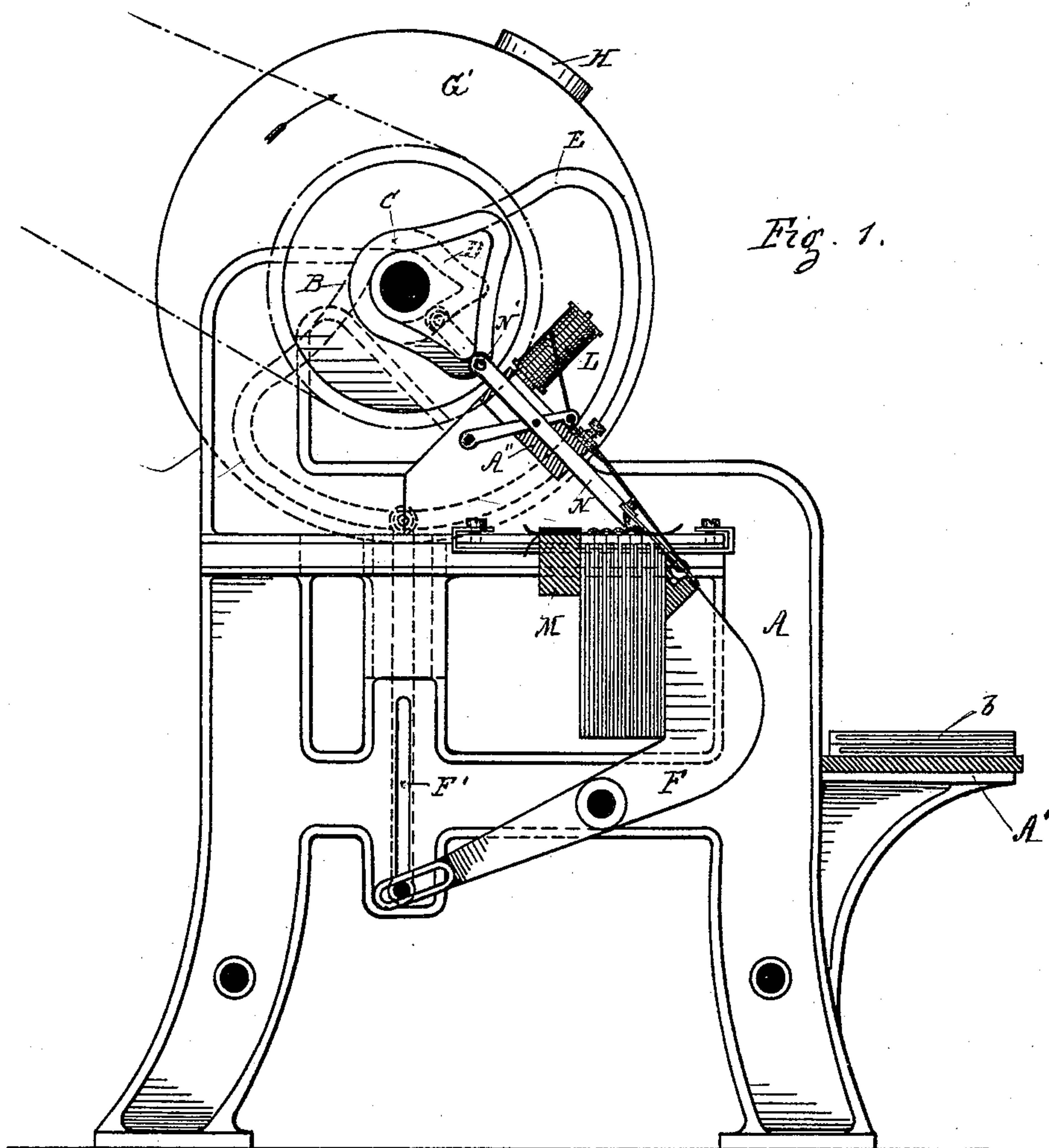
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10 Sheets—Sheet 1.

F. R. KAHNES.
BOOK SEWING MACHINE.

No. 460,582.

Patented Oct. 6, 1891.



Witnesses.

Wm. Wagner
A. Jonghman

Inventor.

Fred. Robert KAHNES
Per Rader & Friedman
Attorneys

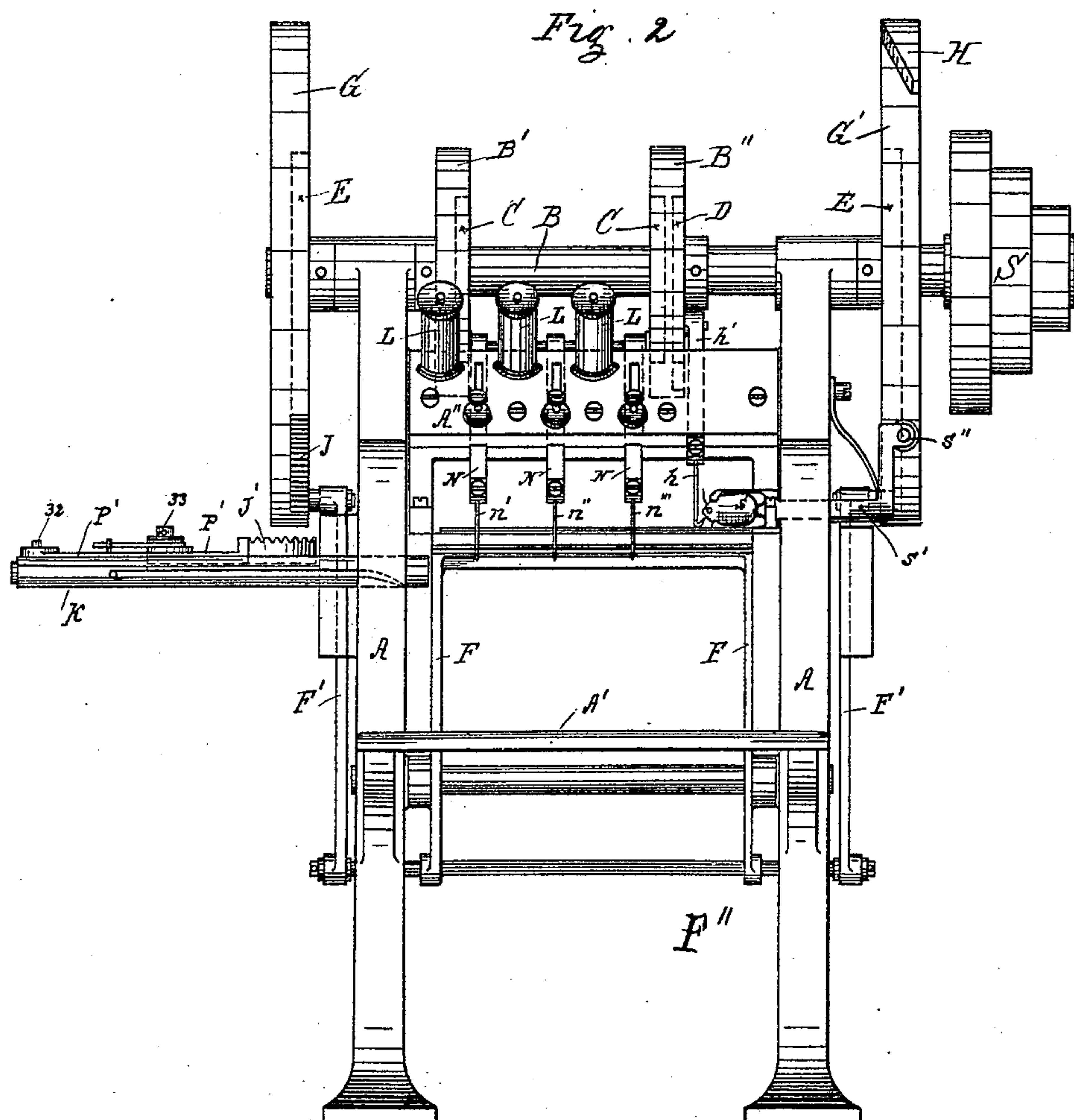
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Witnesses.

Wex Wagner
Hogglmans.

Inventor.

Inventor.
 Frank Robert Holmes
 per Rader & Brice
 Attorneys.

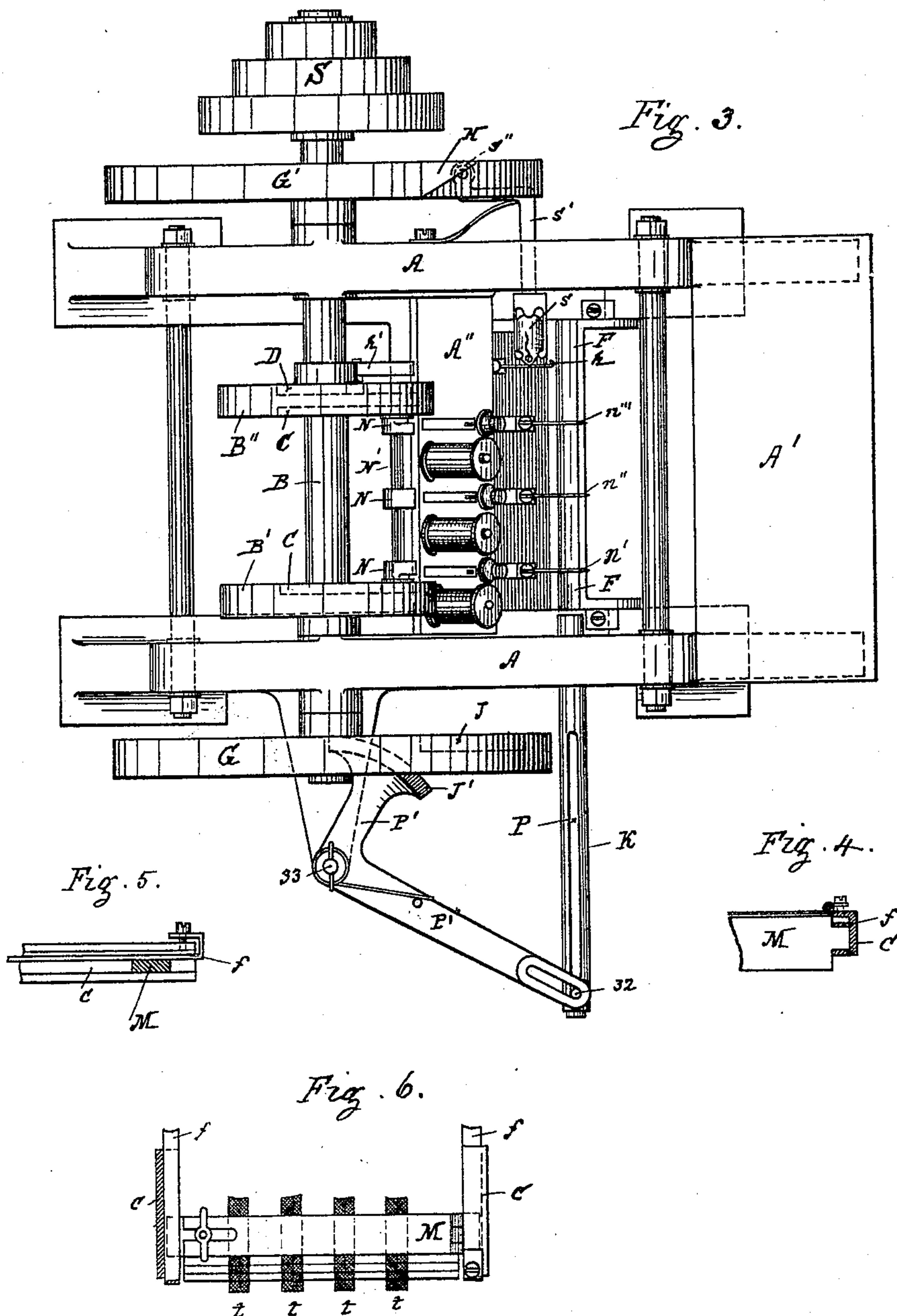
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Witnesses.

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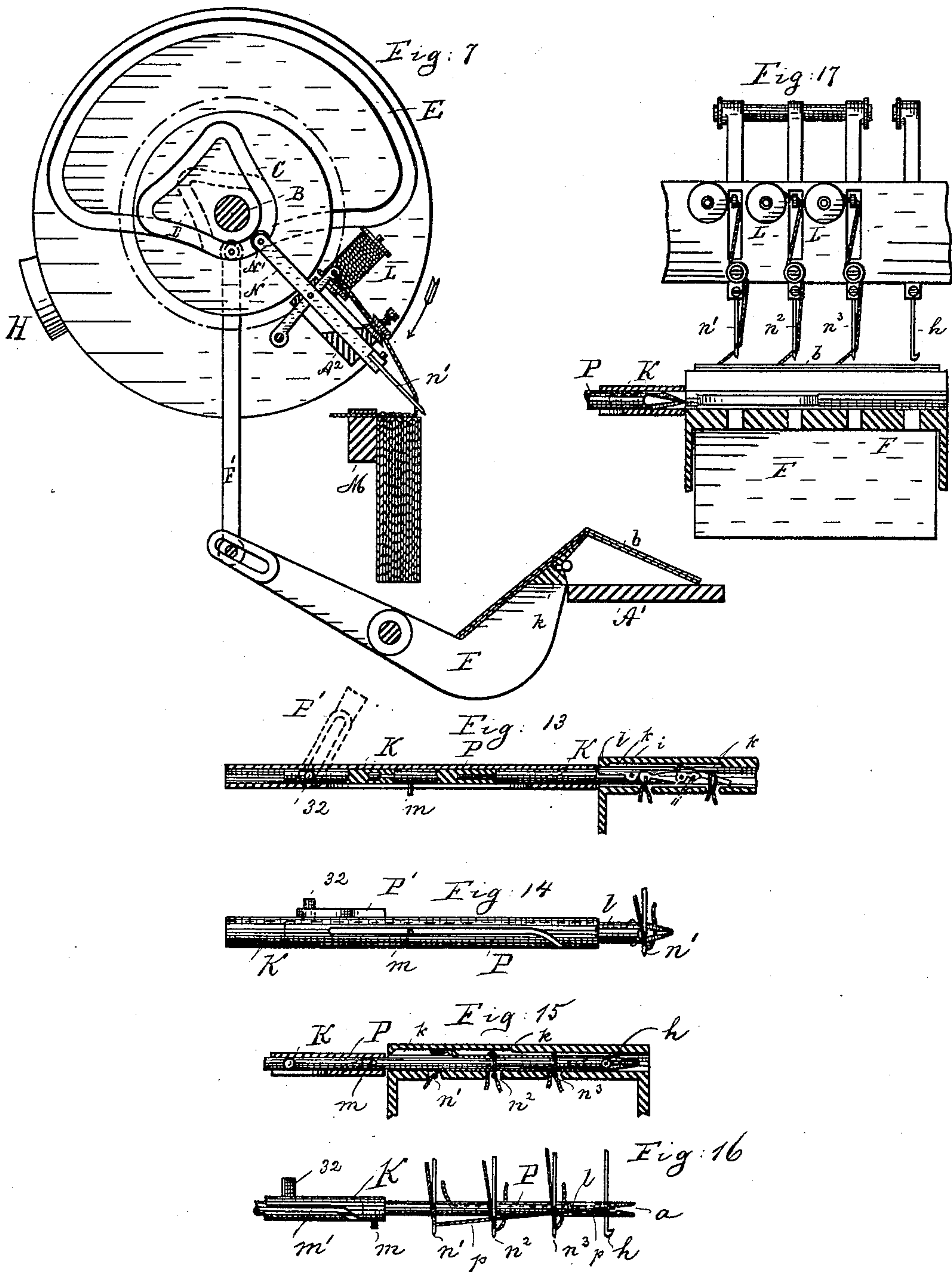
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F. R. KAHNES.
BOOK SEWING MACHINE.

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Patented Oct. 6, 1891.



Witnesses:
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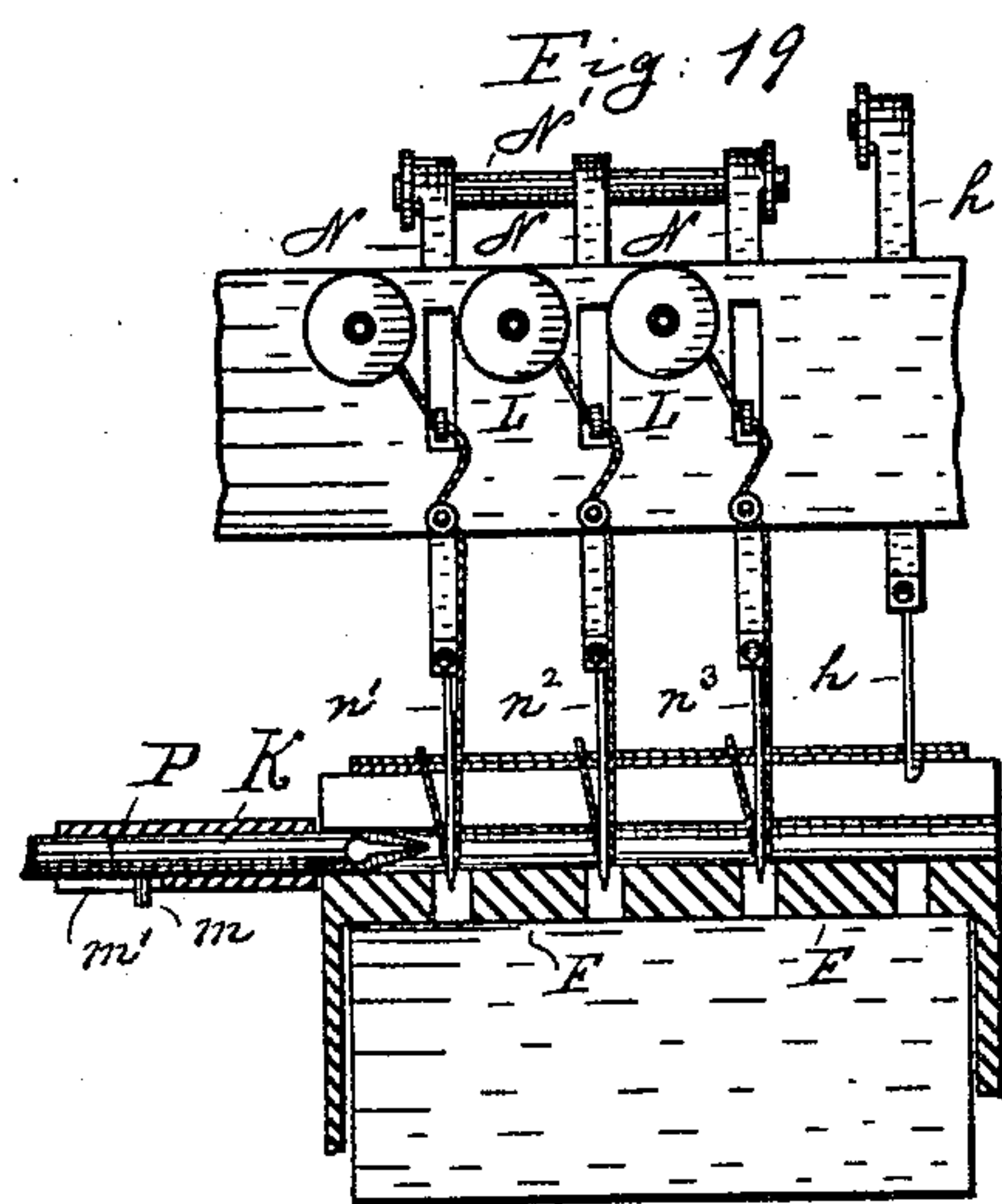
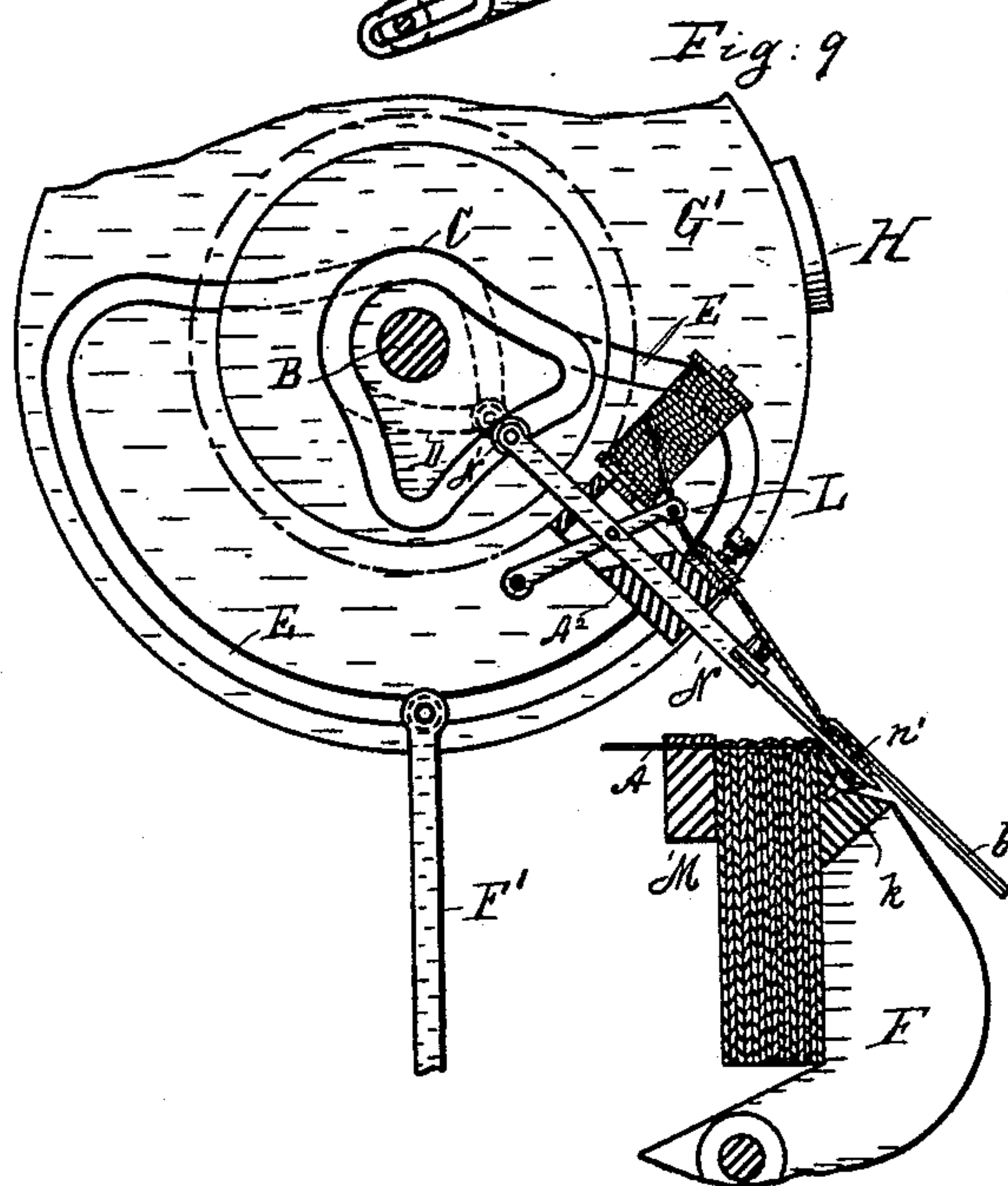
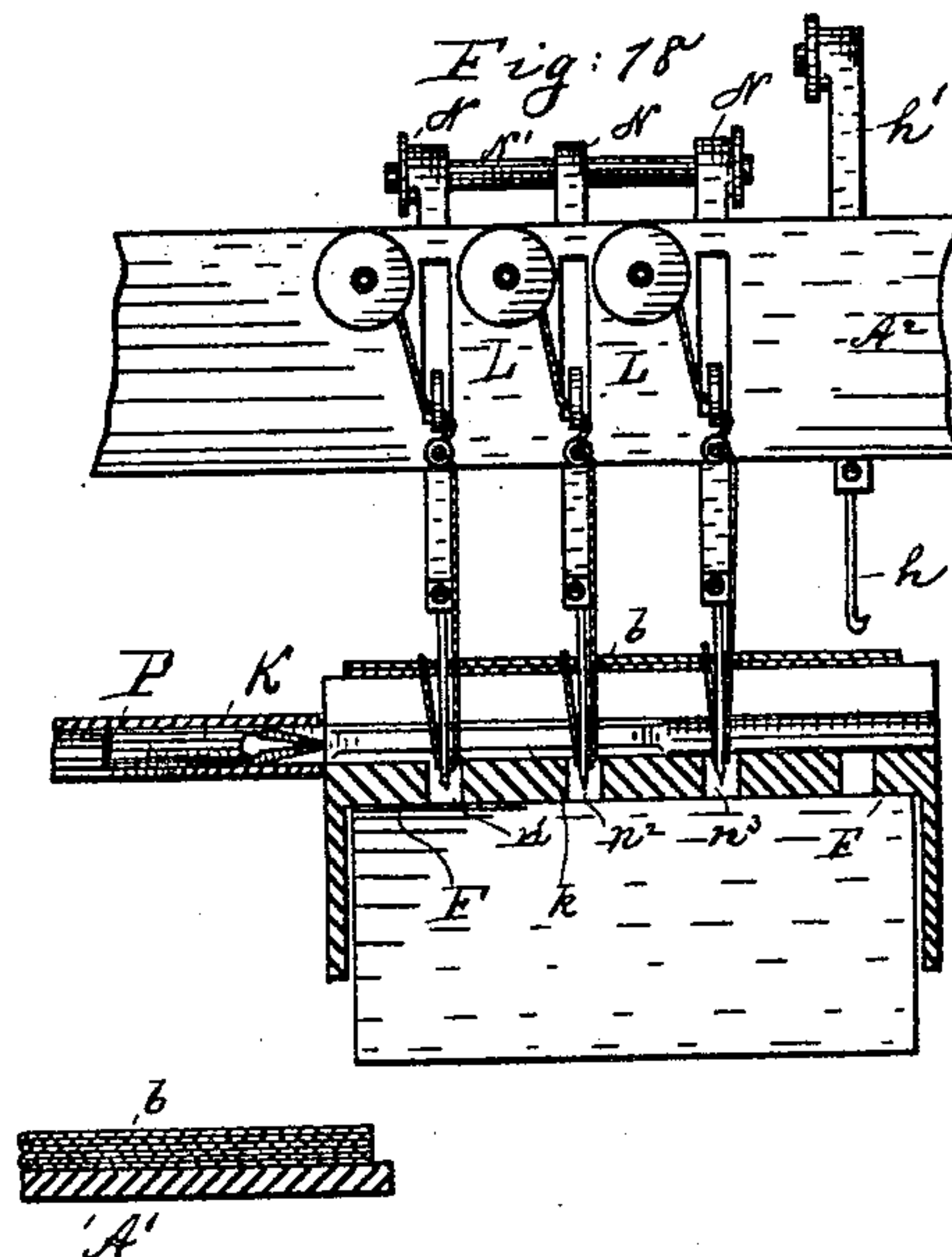
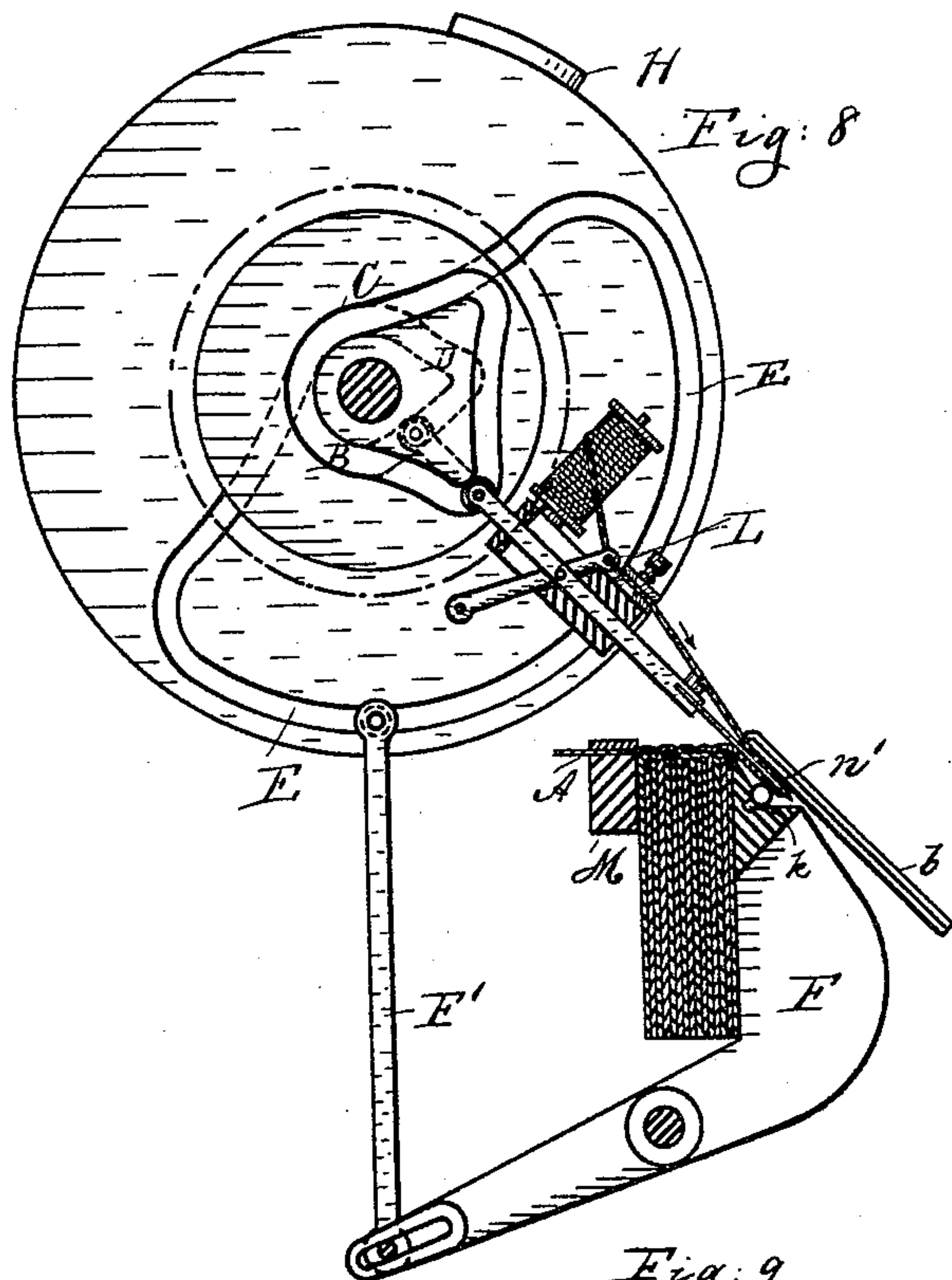
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Patented Oct. 6, 1891.



Witnesses
Wm. Schütz.
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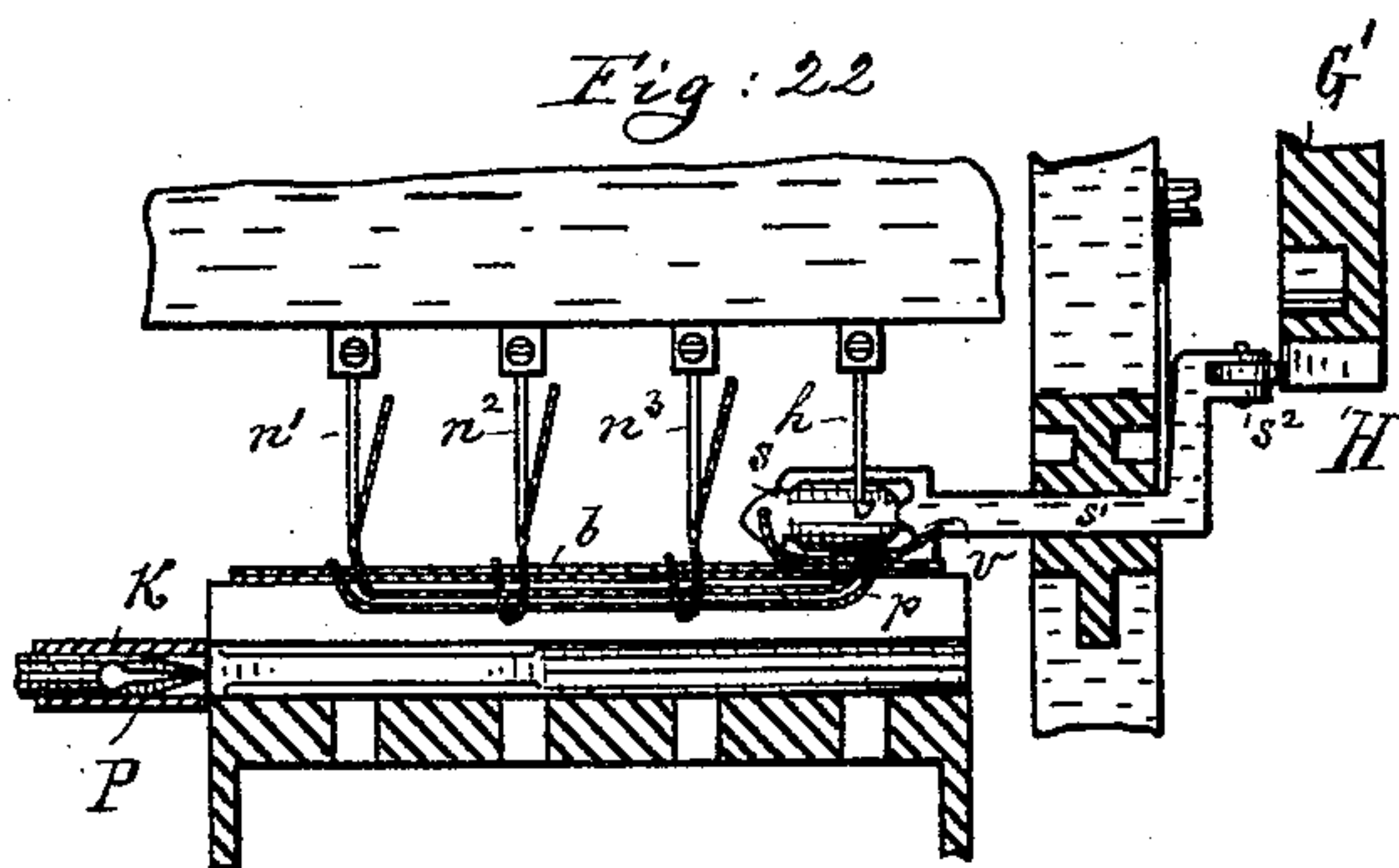
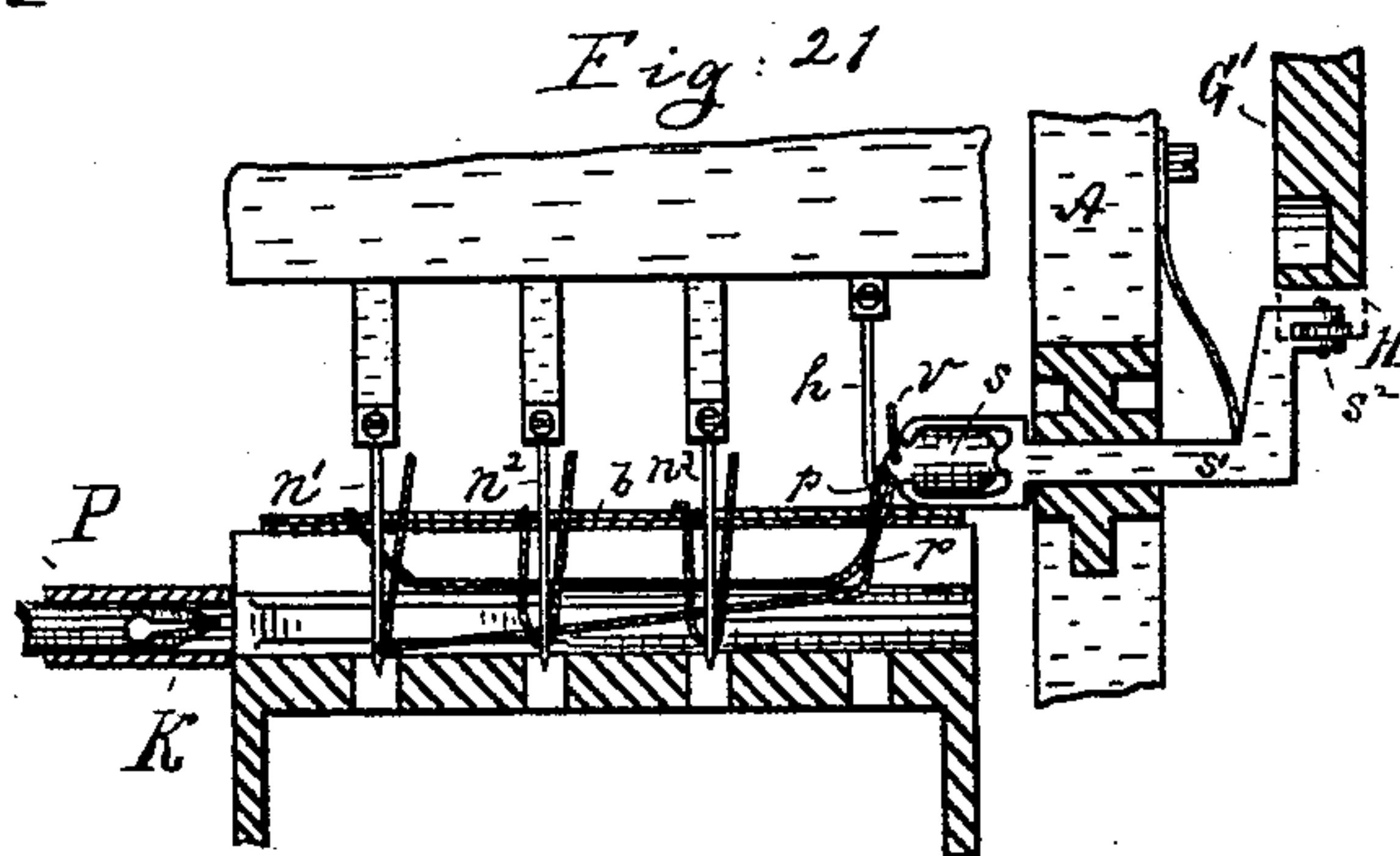
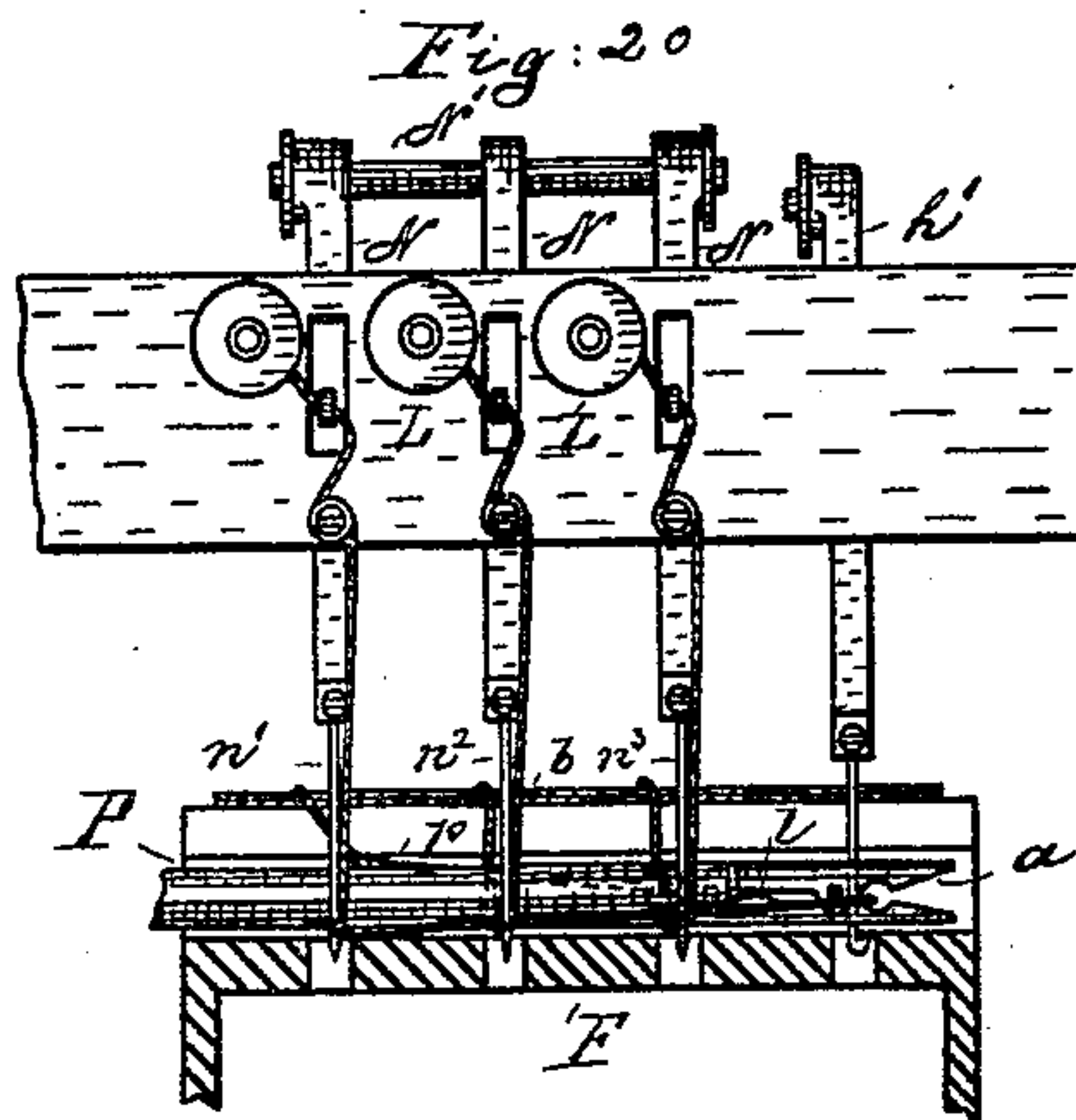
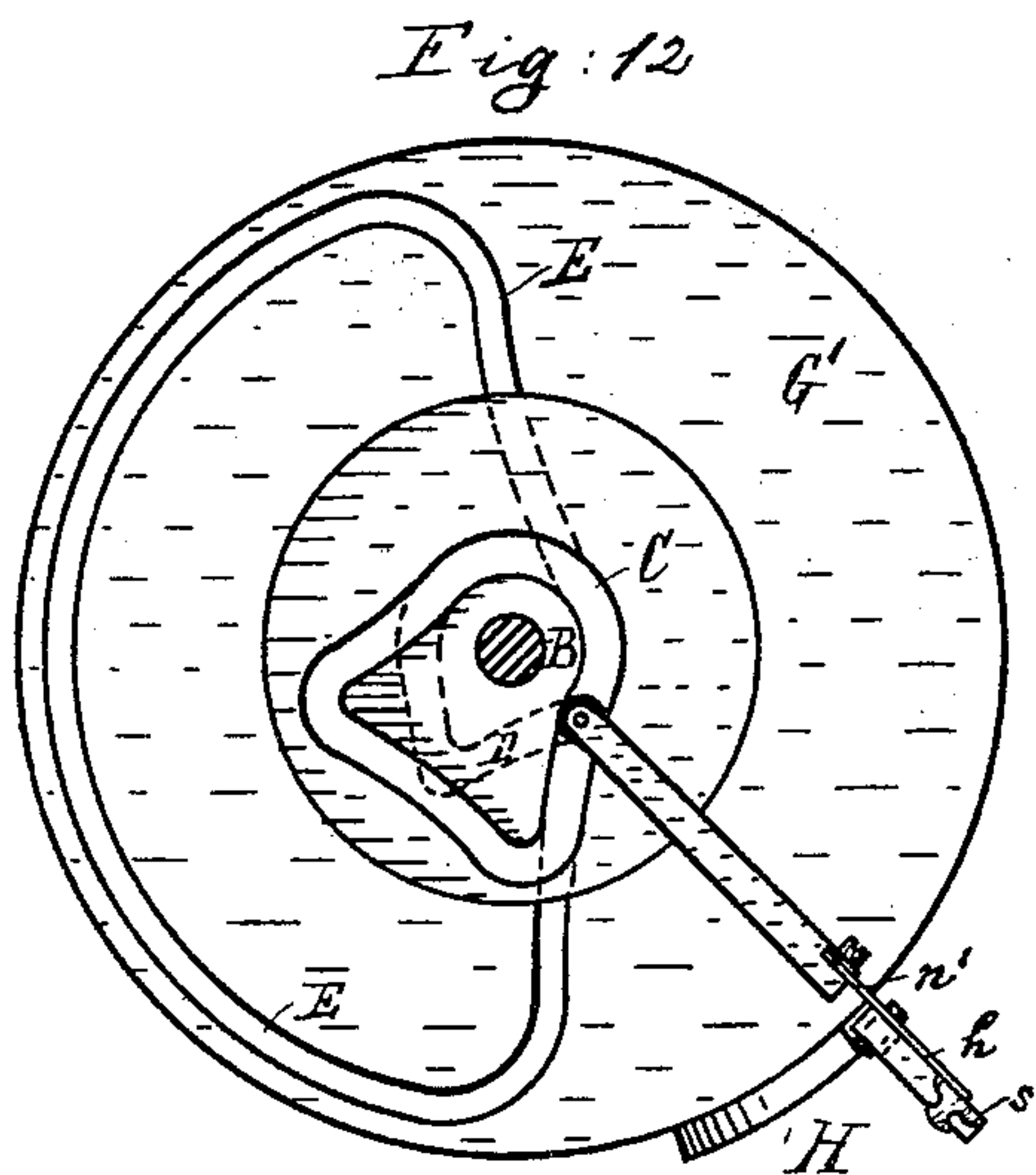
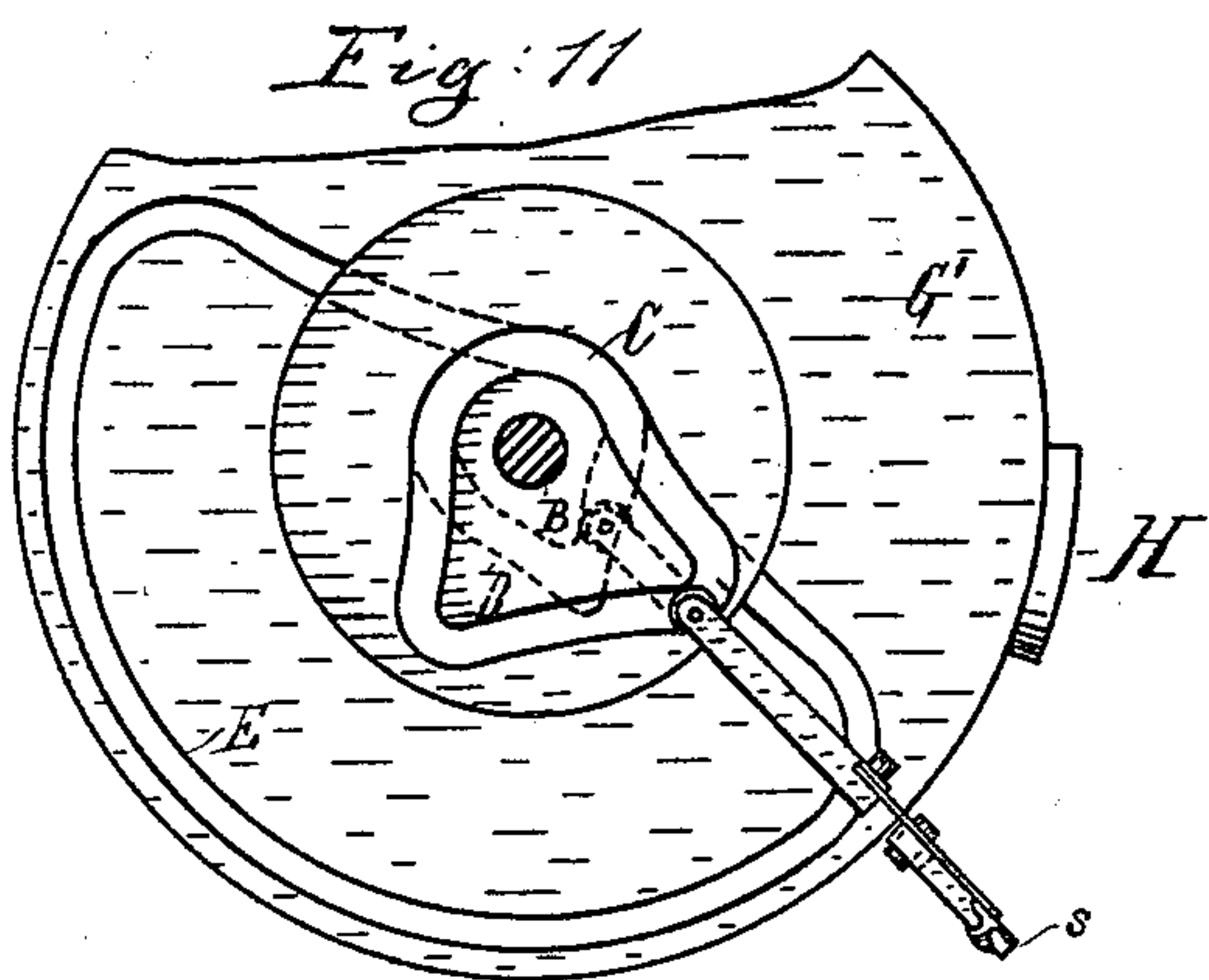
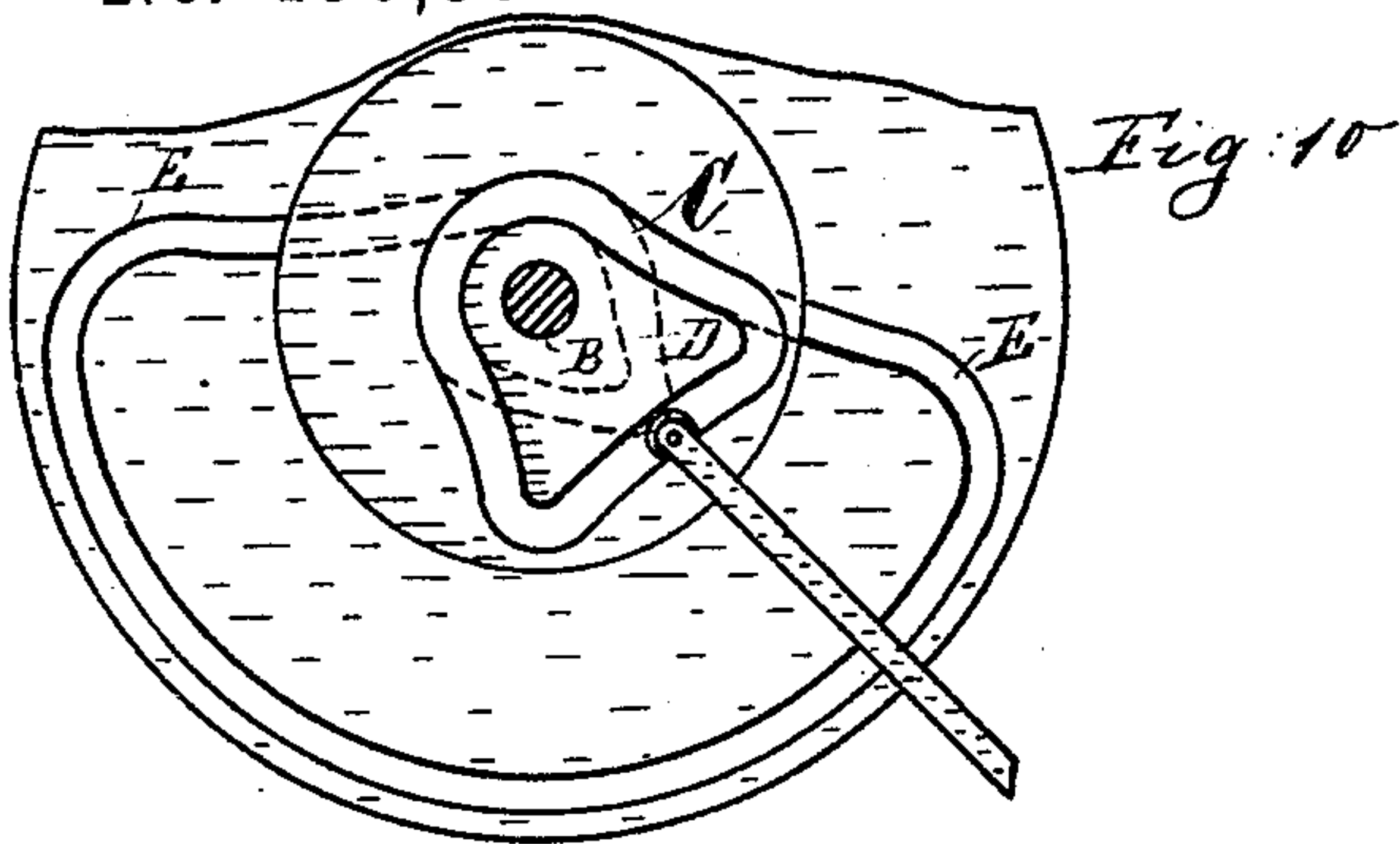
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Witnesses:
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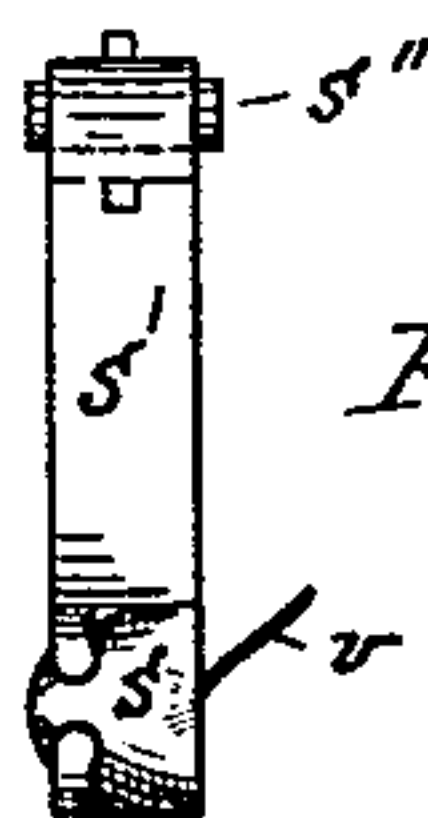
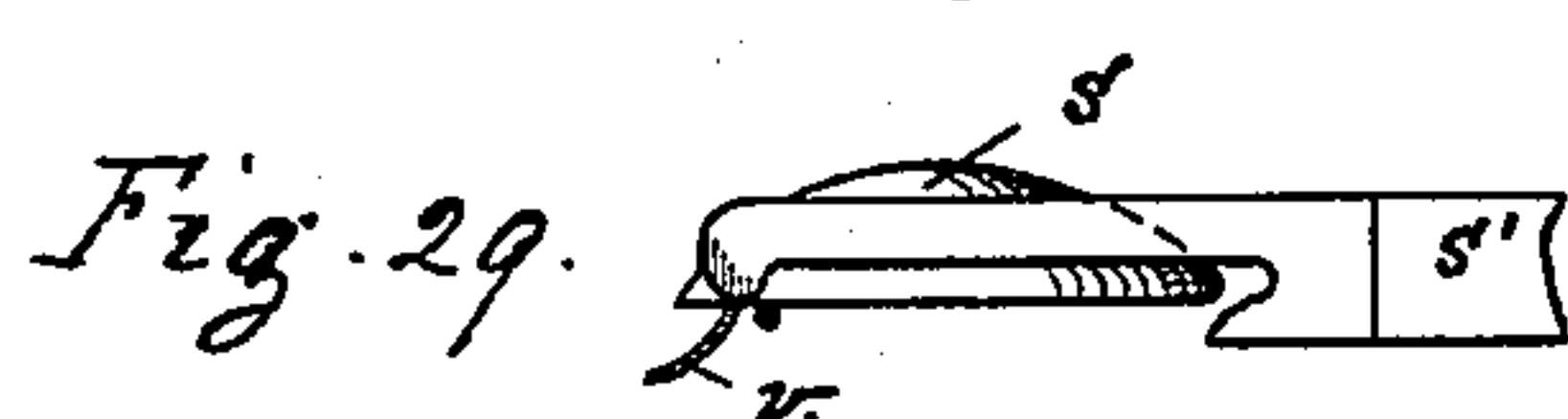
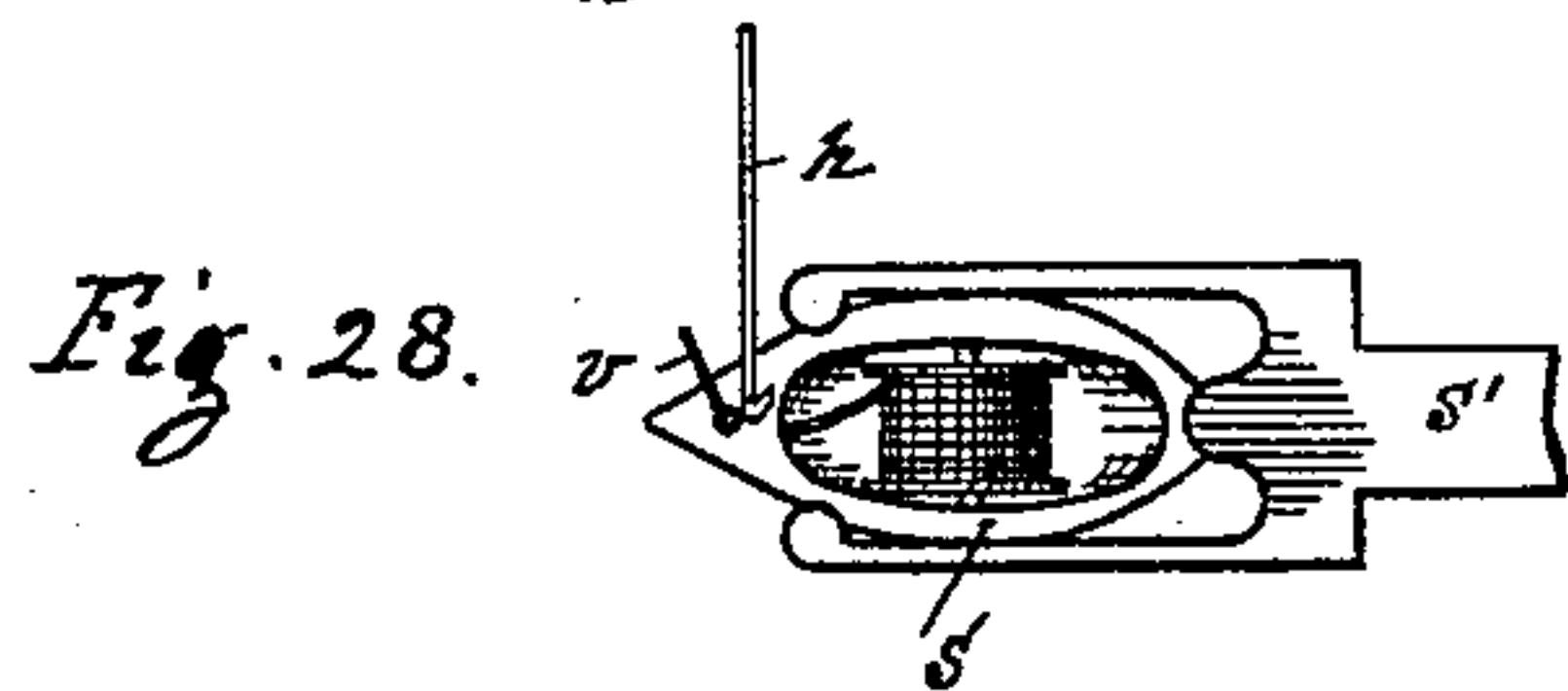
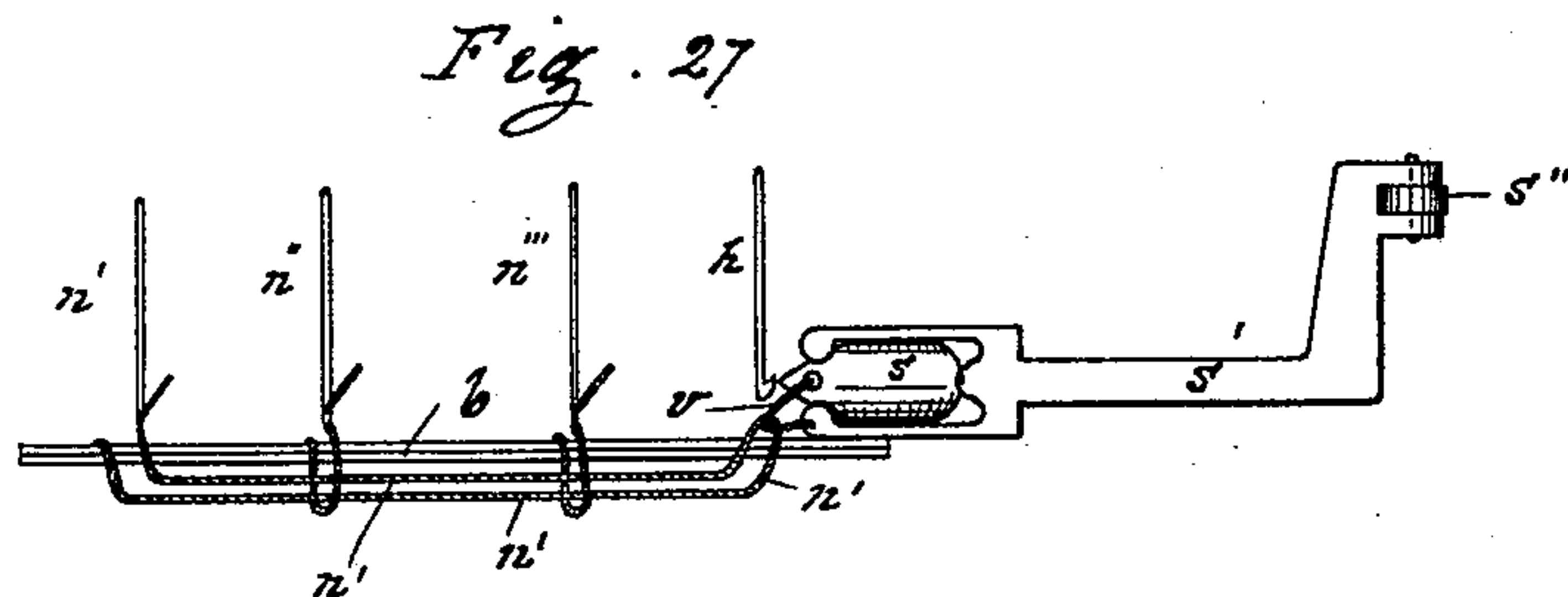
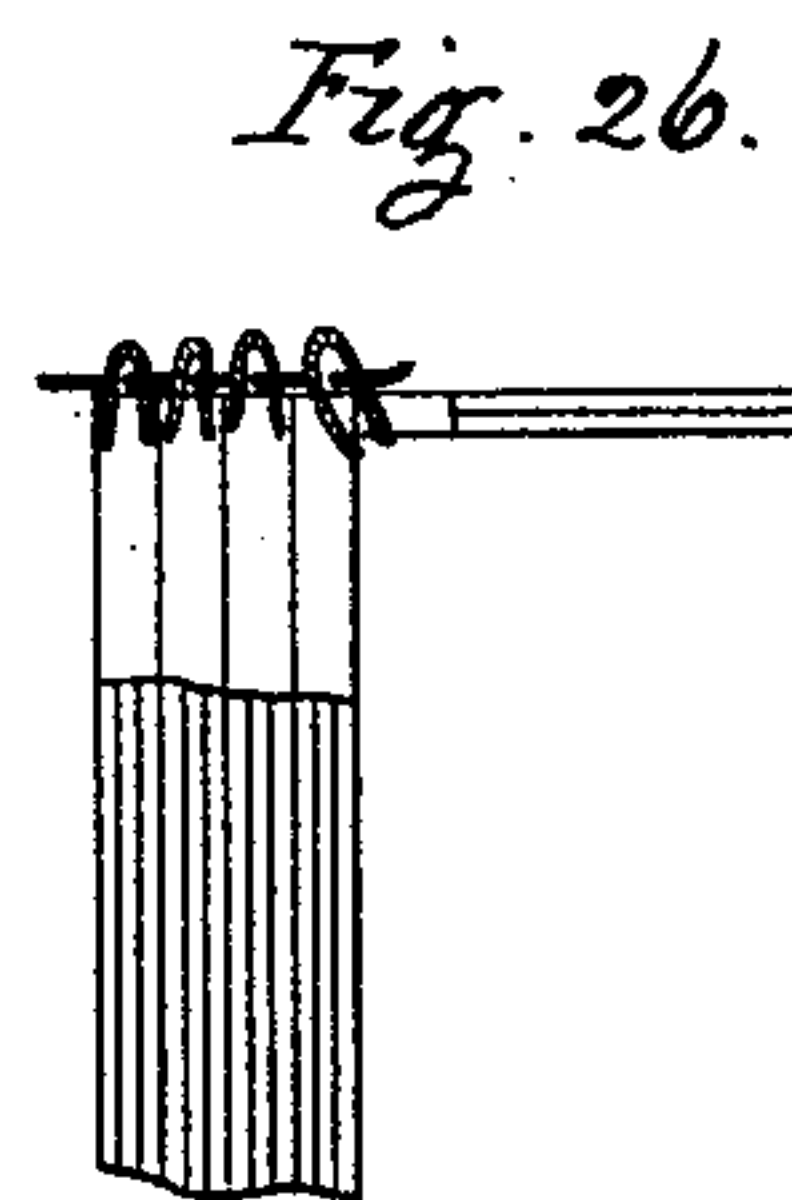
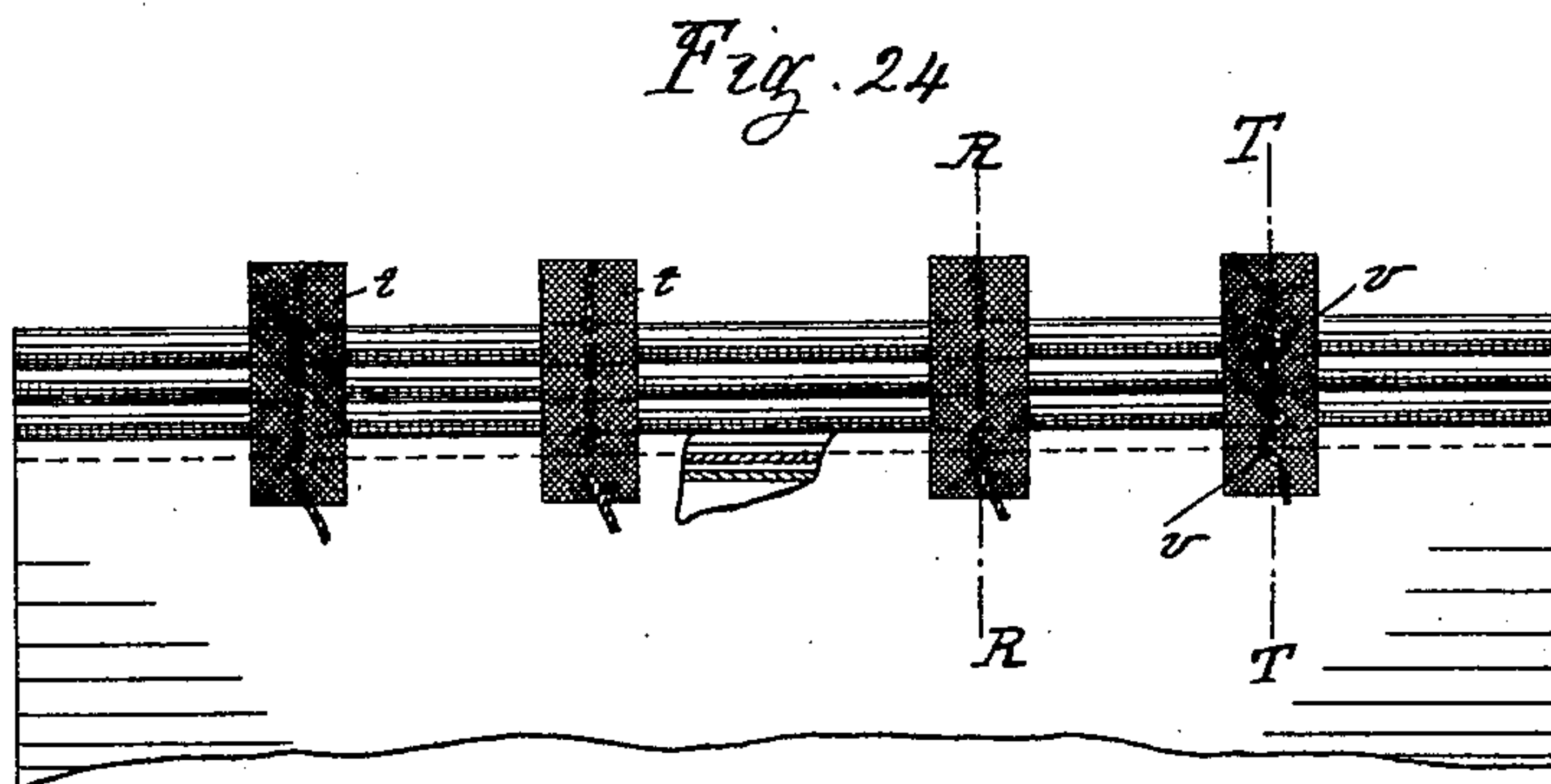
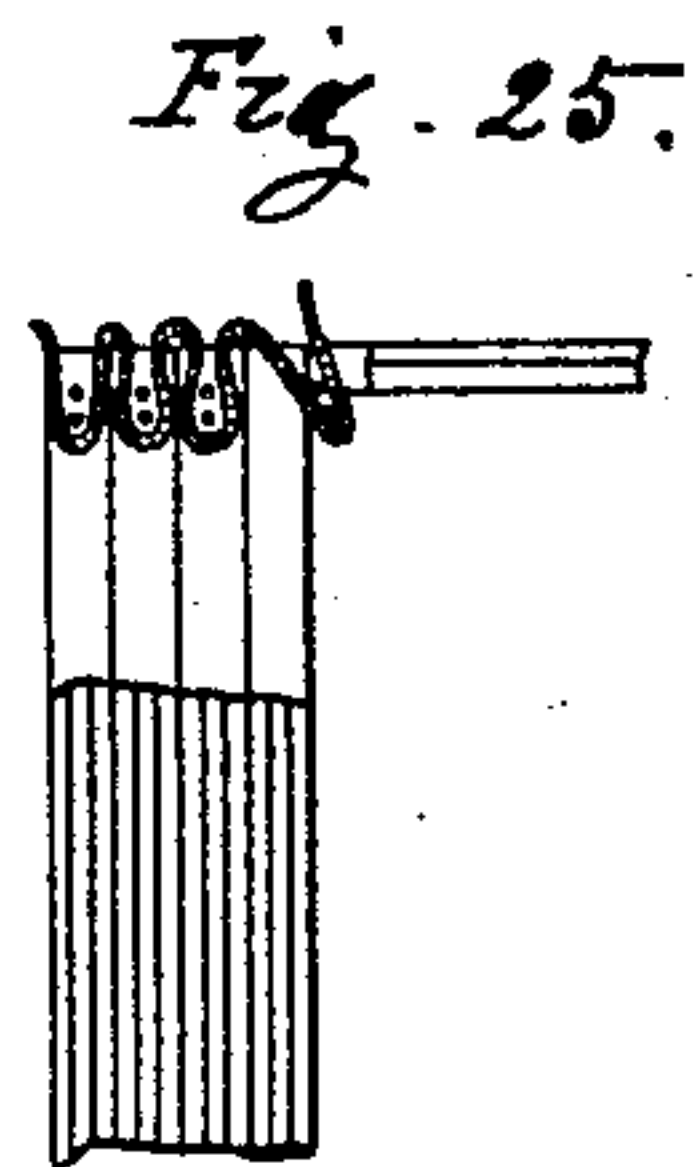
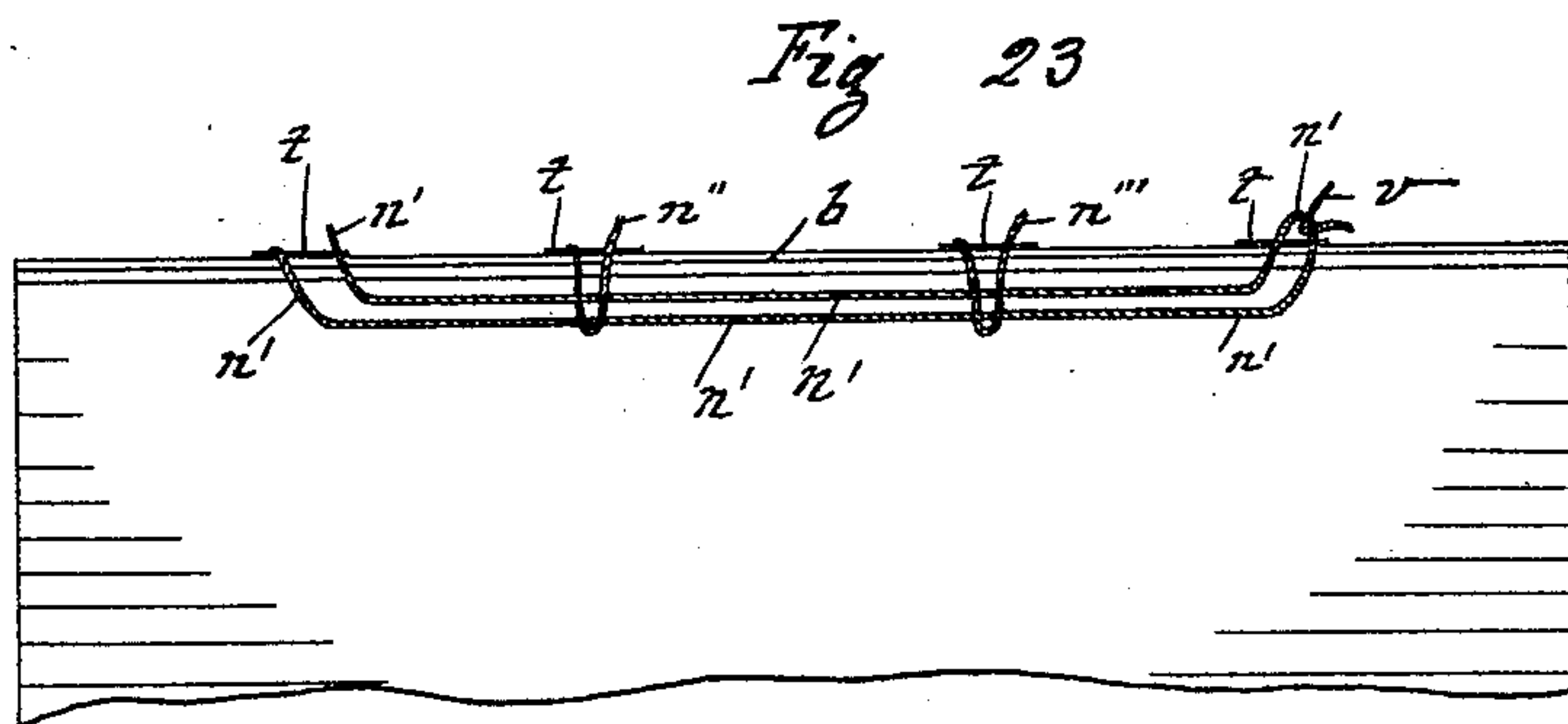
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Witnesses

Wm. Wagner.
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Inventor.

Frank Robert KAHNES
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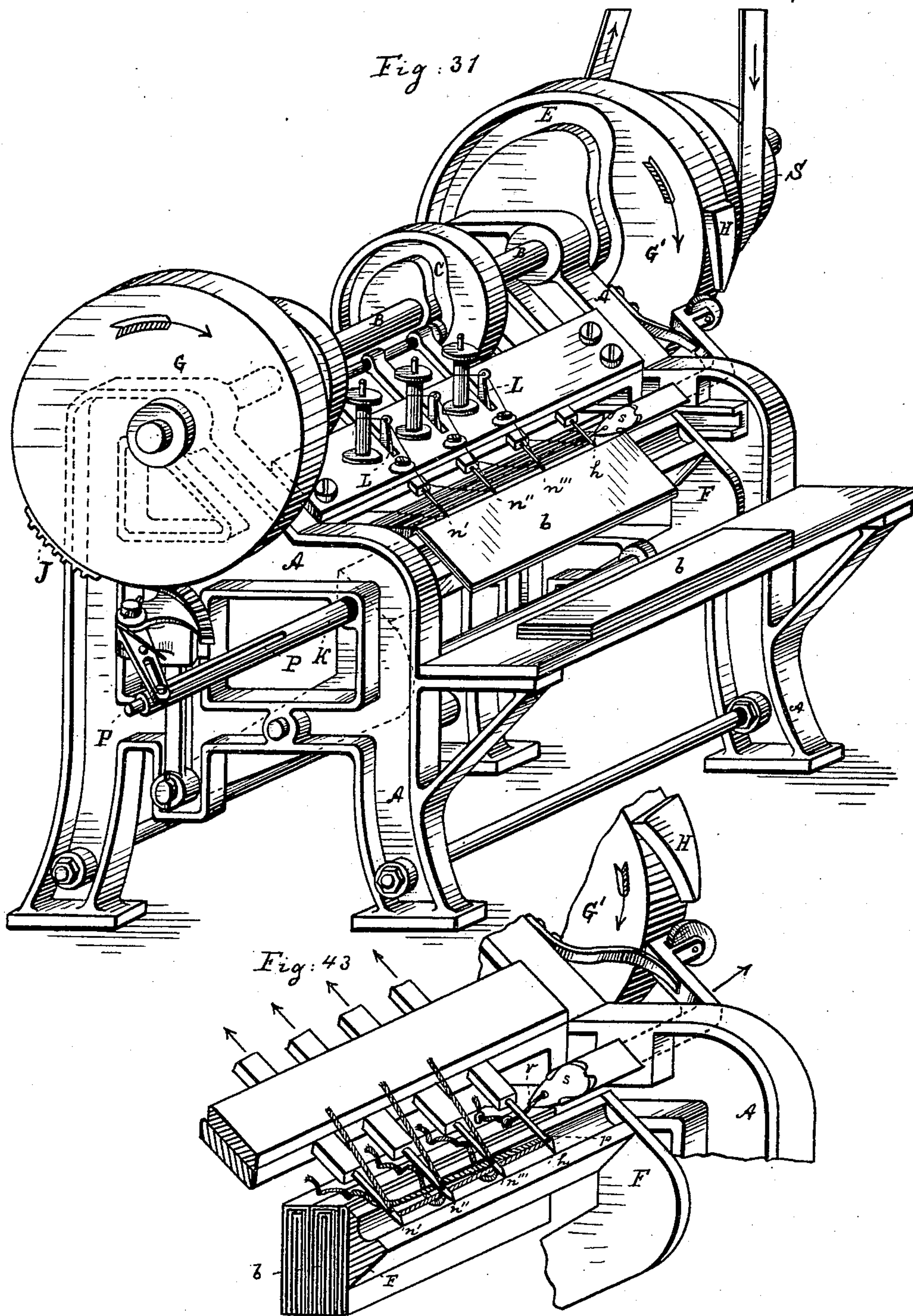
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Patented Oct. 6, 1891.



Witnesses:
Wm. Wagner.
A. Goughman.

Inventor:
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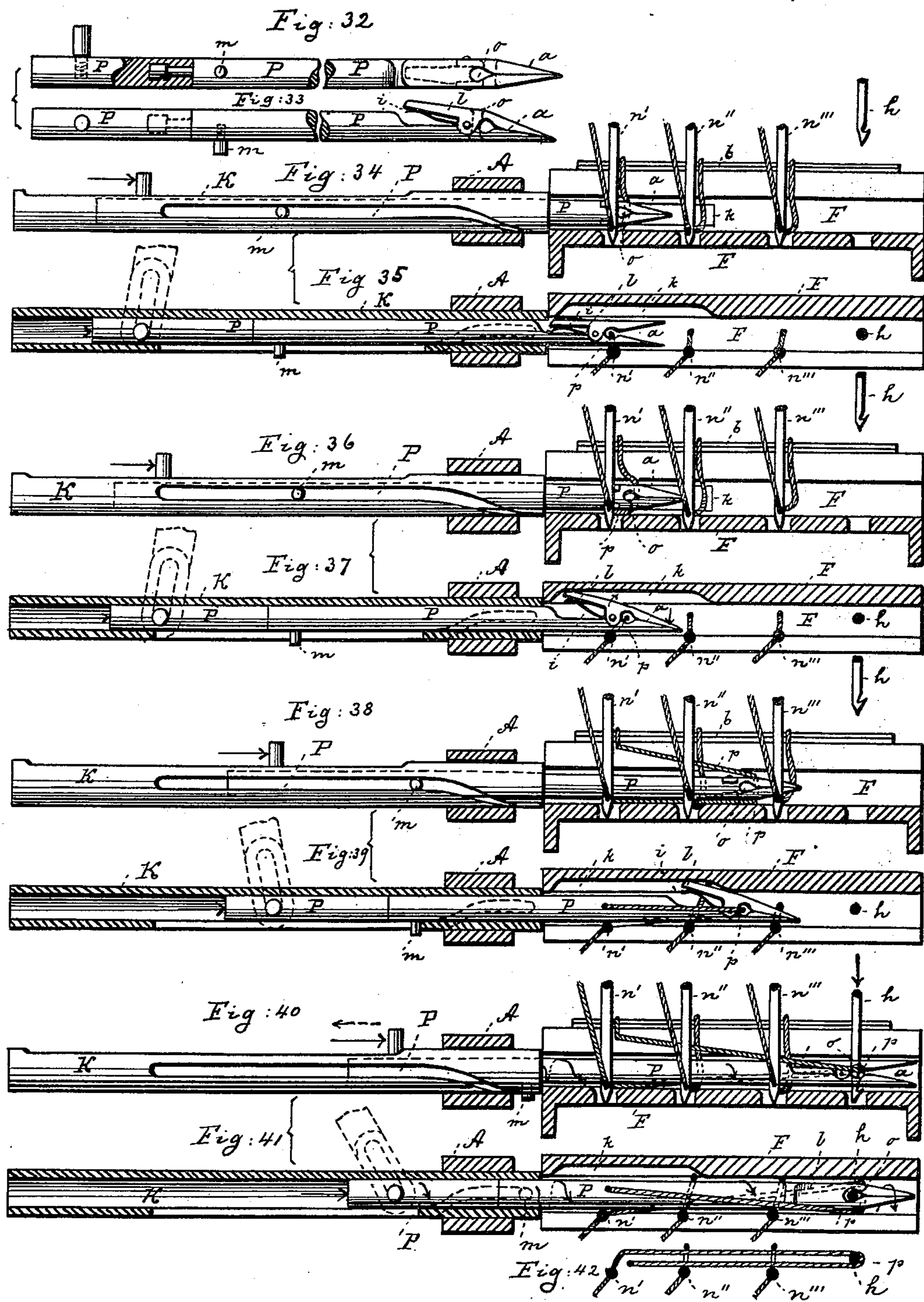
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Witnesses:
Wm. Wagner
A. Goughmans.

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Roeder & Briesen

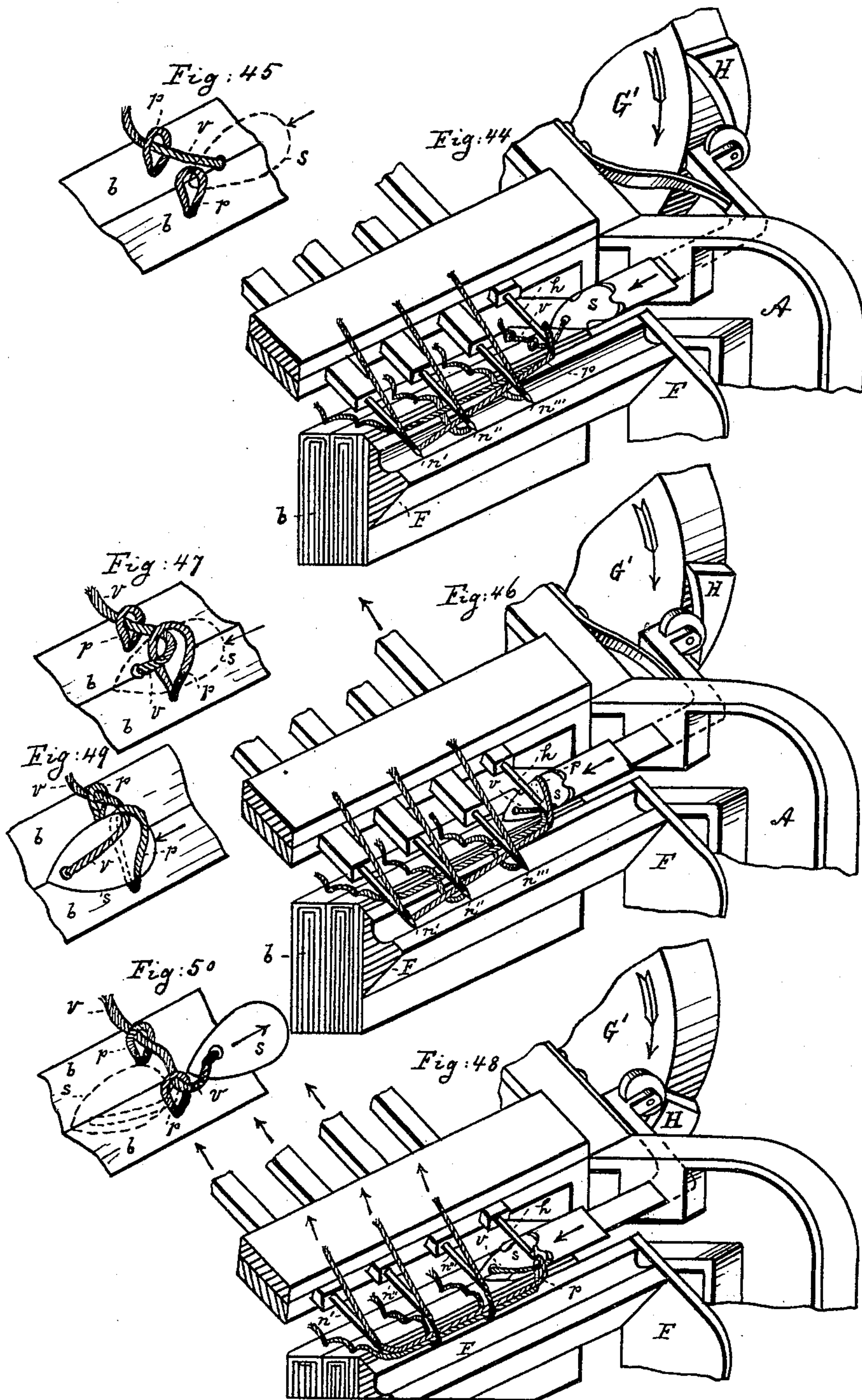
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No. 460,582.

Patented Oct. 6, 1891.



Witnesses:
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Inventor:
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Roecker & Briesen

UNITED STATES PATENT OFFICE.

FRANZ ROBERT KAHNES, OF LEIPSIC, GERMANY.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 460,582, dated October 6, 1891.

Application filed July 15, 1889. Serial No. 317,564. (No model.)

To all whom it may concern:

Be it known that I, FRANZ ROBERT KAHNES, of Leipsic, Germany, have invented an Improved Book-Sewing Machine, of which the following is a specification.

My invention consists of the various improvements hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a vertical cross-section of my improved book-sewing machine. Fig. 2 is a front view of the same. Fig. 3 is a top view of the same; Fig. 4, a front view; Fig. 5 a side view, and Fig. 6 a plan, of the arrangement for holding the back-strengthening material. Figs. 7, 8, and 9 show side views of the mechanism for operating the needles and the leaf-carrier detached from the machine partly in section in different positions. Figs. 10, 11, and 12 show the cams in different positions of operation. Fig. 13 is a longitudinal section of looper P; Fig. 14, a front view of the same. Fig. 15 is a plan, and Fig. 16 a front view, of the looper in position after having passed through the binding-threads. Figs. 17 to 22 show front views of the eye-pointed needles in different positions of operation, with their connecting parts partly in section. Fig. 23 represents the position of eye-pointed needle and looper-threads at an enlarged scale. Fig. 24 is a plan of the same. Fig. 25 is a cross-section on line R R, Fig. 24. Fig. 26 is a cross-section on line T T, Fig. 24. Fig. 27 is a view similar to Fig. 23, showing part of the eye-pointed needles, the hooking-needle *h*, and its shuttle. Fig. 28 is a top view, Fig. 29 a side view, and Fig. 30 an end view, of hooking-needle shuttle, with part of its carrier on an enlarged scale. Fig. 31 is a perspective view of the machine. Figs. 32 and 33 are elevations at right angles to each other of the horizontally-reciprocating looper P. Figs. 34 to 41 are alternately side views and sections through the lower ends of the eye-pointed needles *n' n'' n'''*, showing the same in successive positions. Fig. 42 represents the loop *p* at the stage when first engaged by hook *h*. Figs. 43, 44, 46, and 48 represent perspective views of part of the machine, showing the eye-pointed needles in different positions. Figs. 45, 47, 49, and 50 represent the loop in successive stages of formation.

To a shaft B, supported in a suitable frame

A, disks B' and B'', as well as disks G G', are attached.

The disks B' B'' have on their surfaces toward the center of the machine opposite each other cam-shaped grooves C, and the disk B'' has on its outer surface an additional cam-shaped groove D.

The disks G G' are provided with cam-shaped grooves E. In the grooves E the upper ends of rods F' work, guided in the frame A and connected to a rod F'', attached to a swinging frame F. This frame takes several sheets or leaves from a table A', Figs. 1, 7, and 8, to carry the same to the place where the sewing is performed in the usual manner and in a position for the eye-pointed needles *n' n'' n'''* to penetrate the folded edge. (See Figs. 8 and 9.) These needles *n' n'' n'''* are attached to needle-bars N, guided in a cross-bar A'', attached to the frame. The upper ends of these bars N are connected through rod N', the ends of which work in the cam-shaped grooves C C, and thus communicate the desired motion to the same and to the needles.

On the right hand of the needle *n'''* another needle *h* is arranged, which I call the "hooking-needle," attached to a bar *h'*, guided in the cross-bar A''. The upper end of this bar *h'* works in the cam-shaped groove D, and thus communicates the desired motion to this hooking-needle *h*.

On the left hand of the frame A a guiding-tube K is attached, in which the horizontally-reciprocating looper P is guided and works. This looper P is provided near its outer end with a pin 32, passing through a slot in the tube K and connected to a bell-crank P', vibrating on a center 33, attached to the frame A. The other arm of this bell-crank is provided with a toothed segment J', operated by the teeth J on the periphery of the disk G. (See Figs. 2 and 3.) On the right hand of the machine a shuttle-carrier *s'* is arranged, guided in the frame A and carrying at its inner end the shuttle *s*, and provided at its outer end with a roller *s'*, acted upon at the desired time by a projection H, attached to the periphery of the disk G'.

The shaft B may be rotated by hand or by power through a number of pulleys S, as shown in Fig. 3.

In Fig. 7 the position of the groove E is

represented so as to have moved the swinging frame F to its lowest position ready to receive a sheet or leaf *b* from the table A'. The frame then carries the leaf into the position shown in Figs. 1, 8, and 9 against a block M, or against the previously-fed leaves lying against said block M, ready to be operated upon. The grooves C have now moved in the position shown in Fig. 8, whereby the needles *n'* *n''* *n'''* have penetrated the folded edge of sheet *b* and make then a slight backward motion to produce the usual loop of the needle-threads on the inner side of the sheet *b*. The teeth J on the disk G come then in contact with the segment J' of the bell-crank P', moving thereby the looper P. The looper P has for its object to form a loop *p* and carry the same to hook *h*, so that it is finally entered into by the shuttle-thread *v*. This looper consists, essentially, of two parts—a front part and a rear part, Figs. 32 and 33. The front part is free to turn in the rear part, the latter being engaged by the driving mechanism and carrying the front part with it; but the front part, in addition to its rectilinear reciprocating motion, has also a revolving motion of ninety degrees. This is produced by a stud *m*, engaging a curved groove *m'* of tube K, that incloses the looper P. The forward end of the looper terminates in a mouth *a*, composed of a pair of jaws that are adapted to close over the loop *p*. The mouth *a* is normally closed by a spring *i*. At right angles to the mouth *a* there is an opening or eye *o* for the admission of hook *h*. This opening *o* runs out in a slit, Fig. 32, so that the looper P is not held back on its sudden return motion by the hook *h*, Fig. 41.

The successive steps in the formation of the stitch are represented in Figs. 34 to 41. After the eye-pointed needles *n'* *n''* *n'''* have pierced the work placed against block M and have assumed their lowermost position, they are by their cams C drawn slightly upward, Figs. 34 and 35, to form a small loop. The looper P, now moving forward with its mouth open, will grasp the thread or loop of the first needle *n'* and take it along with it. During the further forward motion of the loop-carrier its mouth will become closed by a spring *i*, bearing against a rearwardly-projecting arm or lever *l* of the upper mouth-jaw. The rear end of this lever will by spring *i* be pressed into a mortise *k* of the frame F, Fig. 37, the mortise being now in line with the lever. With the mouth thus closed the looper P, with its loop, will pass successively through the loops of the needles *n''* *n'''*, Figs. 38 and 39. The looper P on its further forward motion is now revolved ninety degrees in manner described, so that the opening *o* is brought vertically under the hook *h*, Figs. 40 and 41. This hook will now enter through the opening behind the loop. The last revolution of looper P will again have opened its mouth *a*, as the lever *l* will have been brought

out of line with mortise *k*, Figs. 40 and 41. When the looper P has arrived at its terminal forward position, the hook *h* begins its operation and descends through opening *o* and behind loop *p*. On the return motion of the looper P its loop *p* remains engaged by hook *h*, Figs. 42 and 43, and is by such hook drawn up through the work, Figs. 44 and 45. The shuttle *s*, with its thread *v*, is now driven through the loop *p*, held by hook *h*, Figs. 46 and 47. The loop being drawn up farther, will slip off the rear end of the shuttle *s*, Figs. 48 and 49, and the shuttle will then be returned to its normal position, Fig. 43, by its actuating mechanism. The shuttle-thread *v* has thus been drawn through the loop *p*, Fig. 50, to form a complete stitch, and in this way the operation is continued until the work is completed.

The cross-bar A'', which guides the needle-bars, carries the thread-spools L for supplying the needles *n'* *n''* *n'''*, as well as the required tension-levers and guides for the threads.

The several levers are brought against a block M, guided in frame *c*, attached to the frame of the machine. This block M moves gradually backward as one sheet after the other is moved against it by the action of the swinging frame F. This backward motion is regulated by friction-springs *f*, attached to the block M and working in the guides *c*. (See Figs. 4, 5, and 6.) To the top of the block M stiffening-strips *t* are attached to lay upon the edges of the several leaves, and that strengthen the same where they are penetrated by the needles.

According to the size of the leaves to be sewed, the number of the needles *n'*, *n''*, and *n'''* may be increased, if desired; but in all cases only one looper P and one hooking-needle *h*, with its shuttle *s*, will be required.

What I claim is—

1. The combination of a series of eye-pointed needles with a horizontally-reciprocating looper, a hook for taking the thread off the looper, and with a shuttle *s*, co-operating with the hook, substantially as specified.
2. The combination of frame F, having recess *k*, with looper P, having eye *o*, a mouth *a* in front of the eye, and a lever *l*, that forms one of the jaws of the mouth and is adapted to enter recess *k*, substantially as specified.
3. The combination of a series of eye-pointed needles with a reciprocating and revolving looper having an eye and a mouth and with a hook adapted to engage the eye, and a shuttle co-operating with the hook, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANZ ROBERT KAHNES.

Witnesses:

MAX MATTHAI,
ERNST VOGEL.