

(No Model.)

3 Sheets—Sheet 1.

J. BÉNAZET.
HEDDLE MAKING MACHINE.

No. 407,325.

Patented July 23, 1889.

Fig. 1

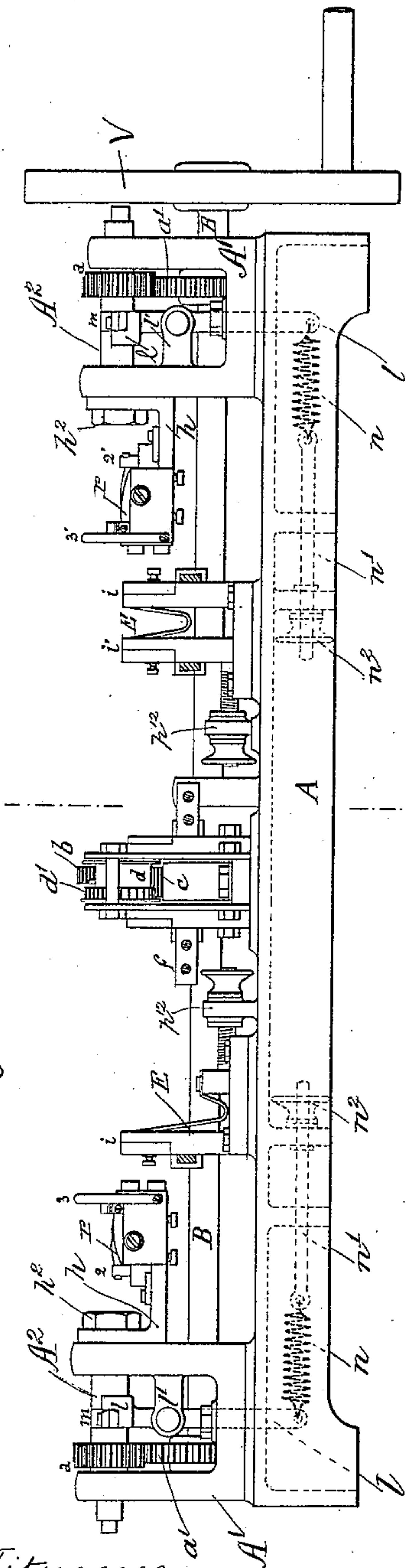
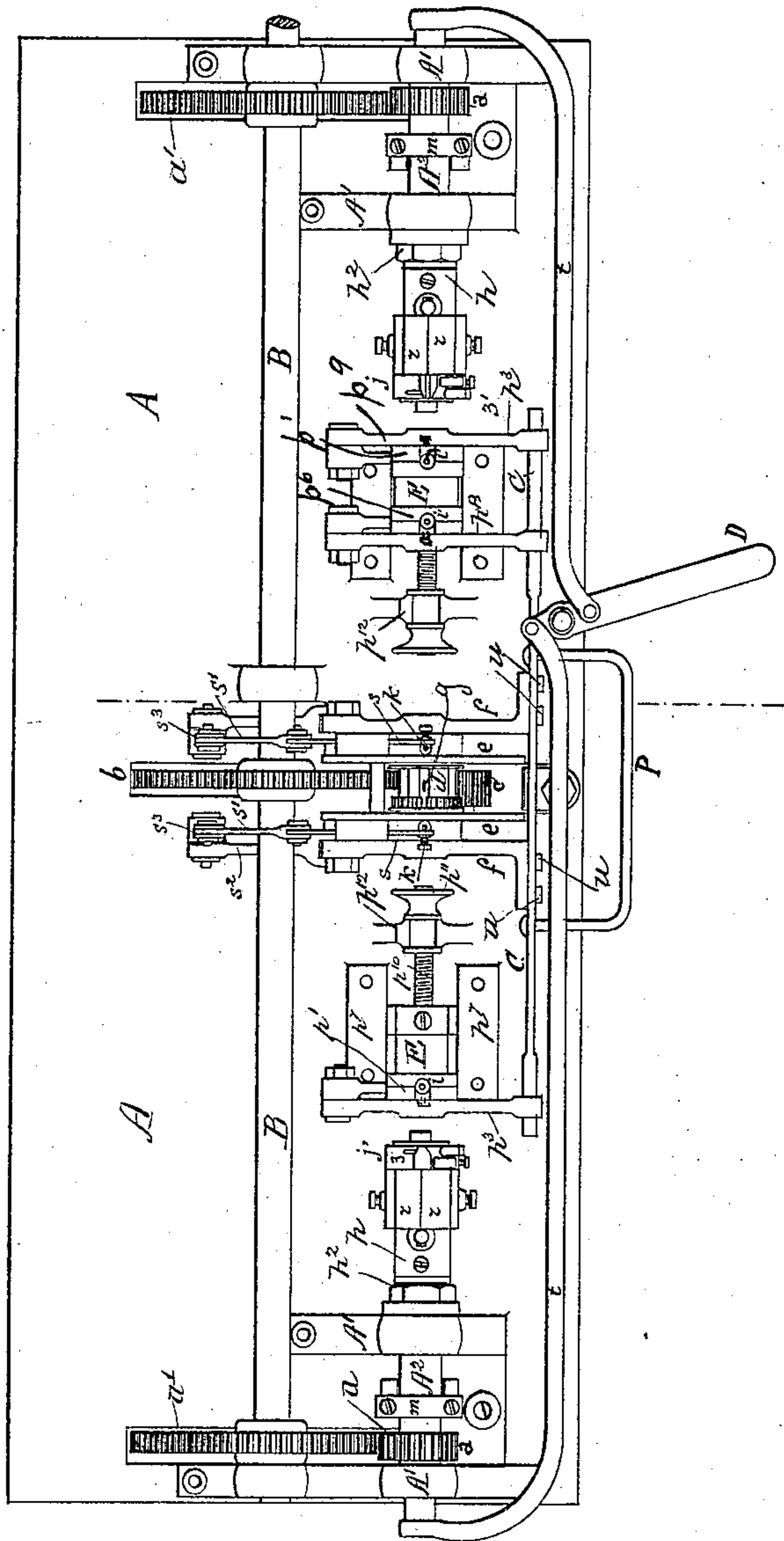


Fig. 2



Witnesses.

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by his Attorney.

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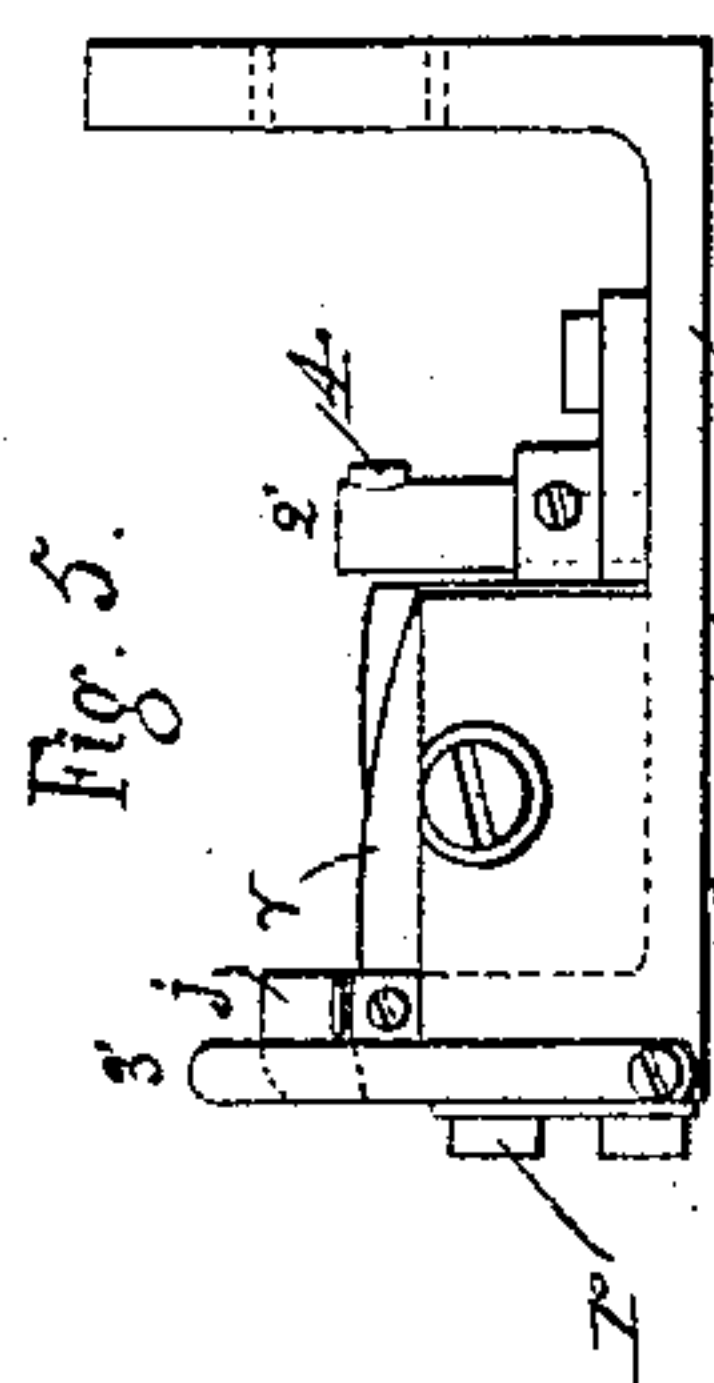
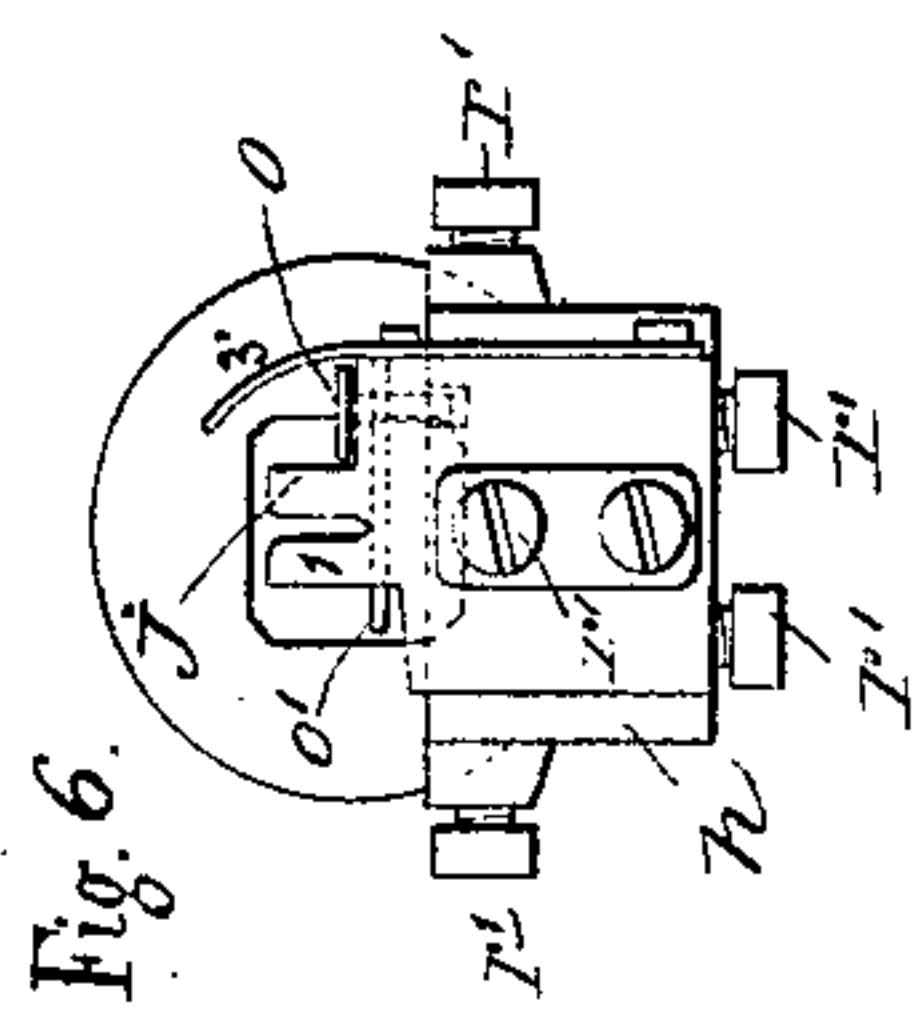


Fig. 7.

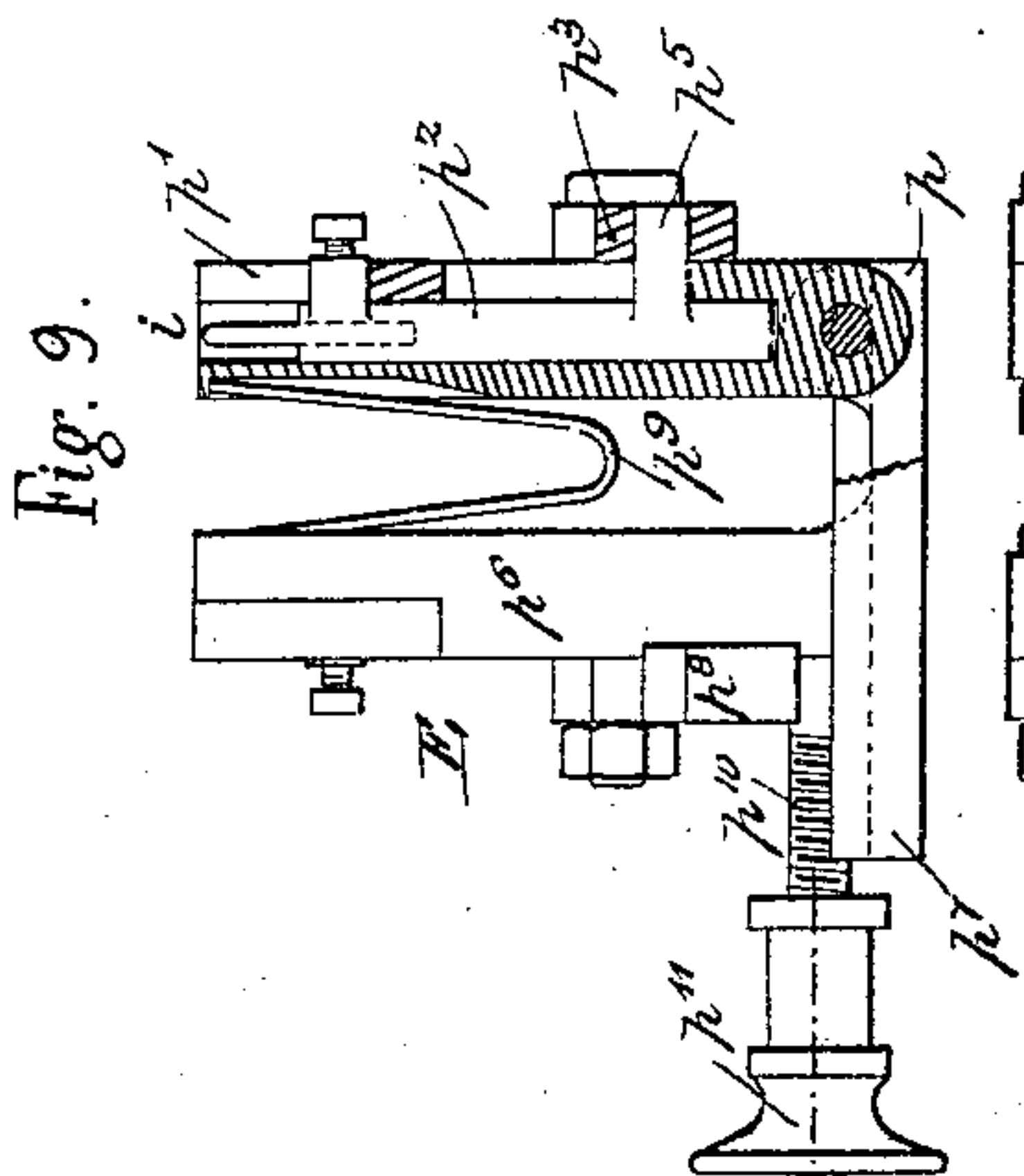
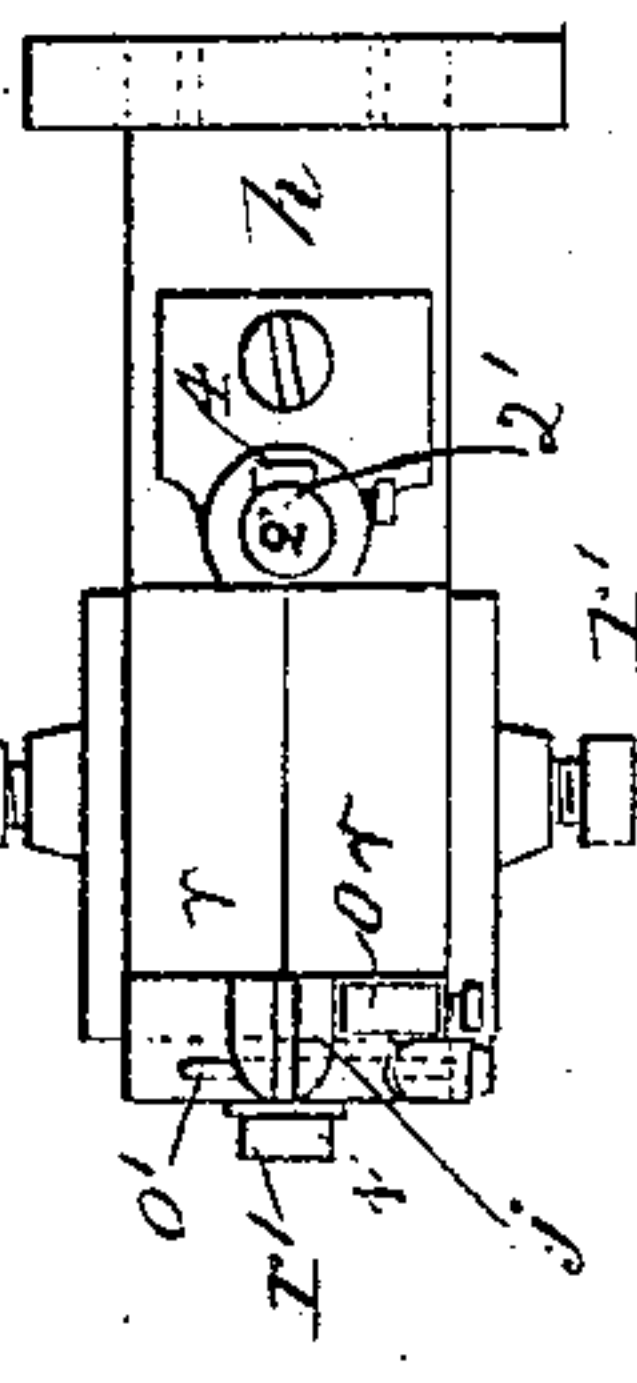


Fig. 8.

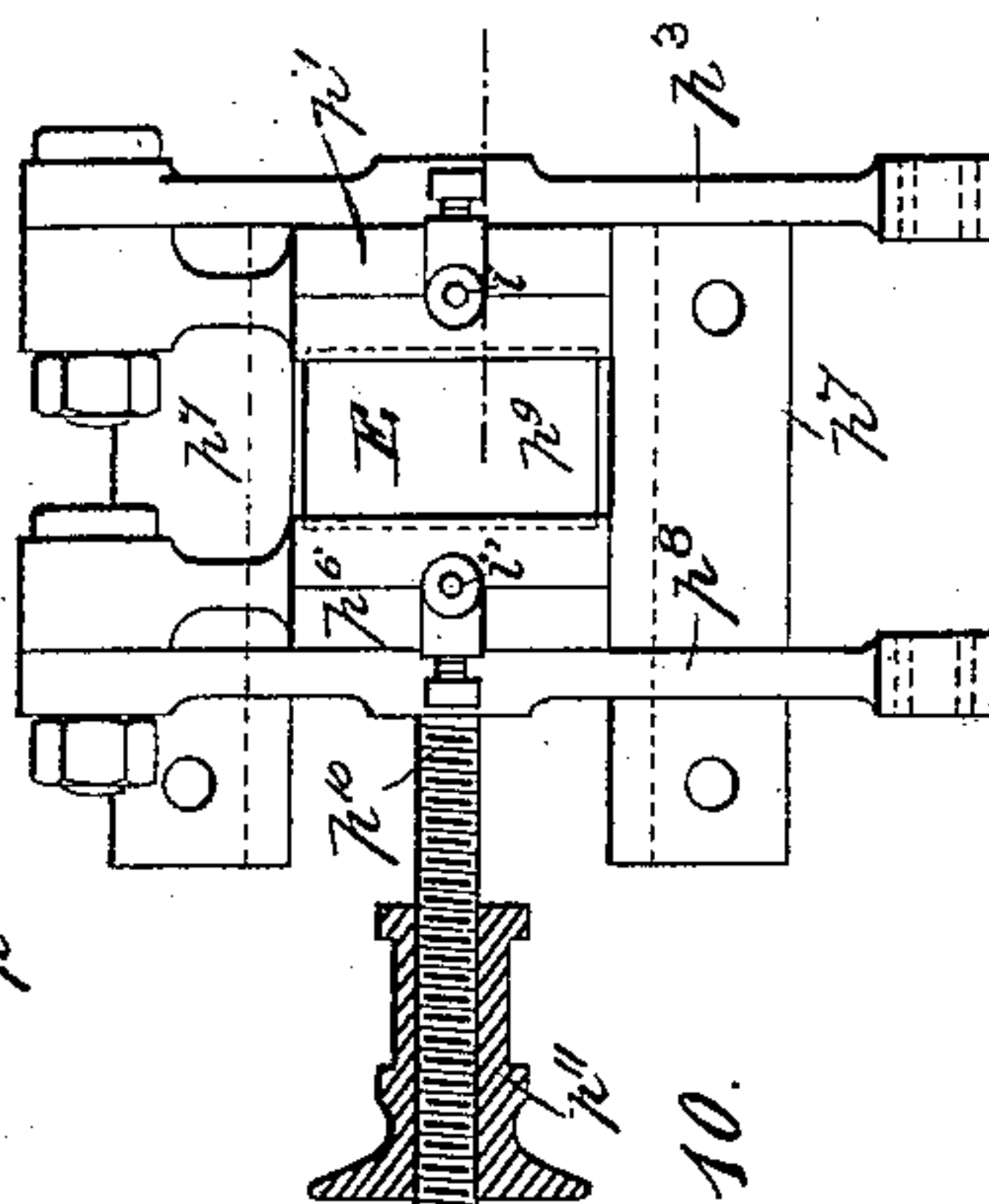
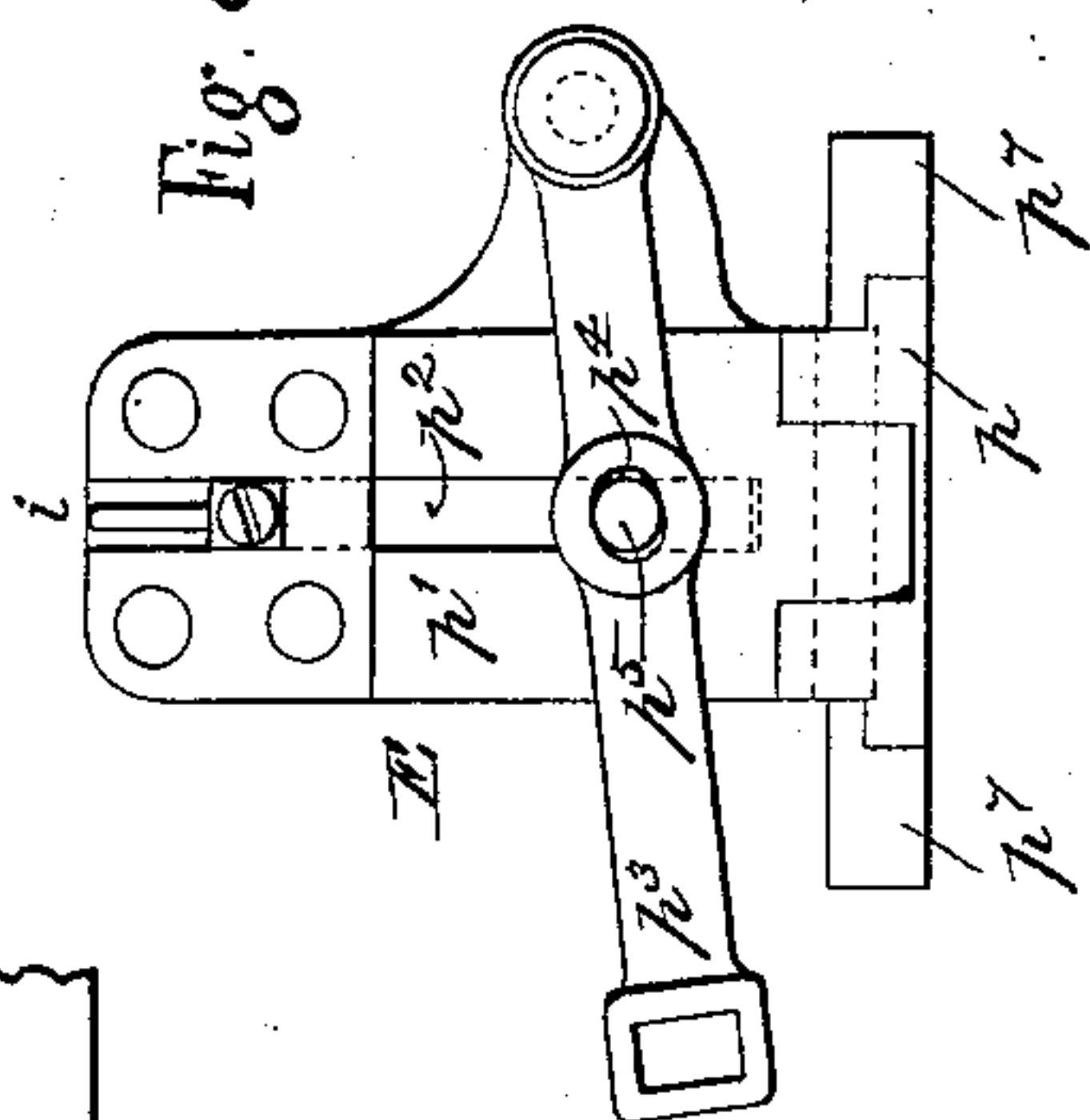


Fig. 10.

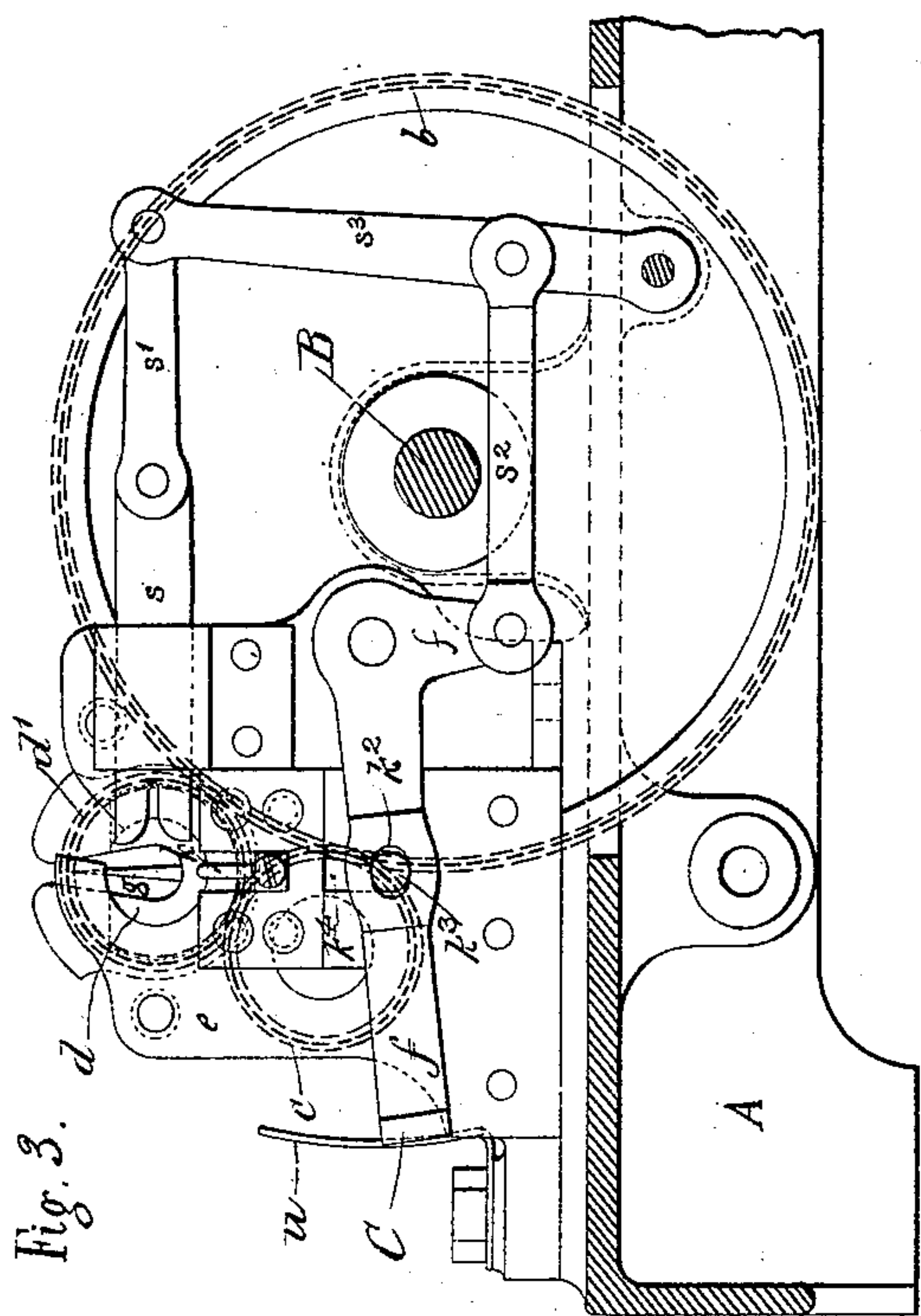
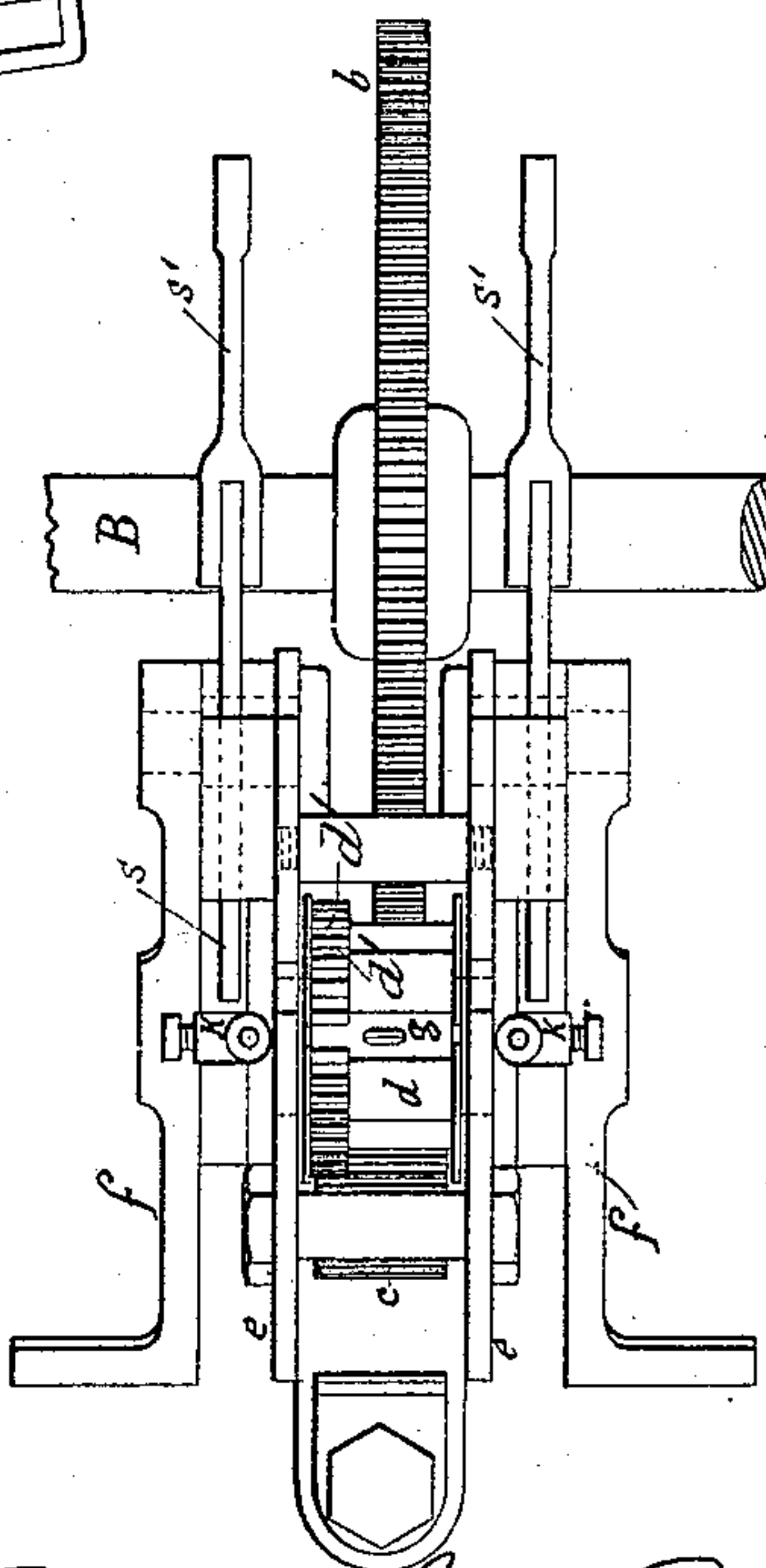


Fig. 3.

Fig. 4.



Witnesses
as Melhuish
a J. Hadden

Inventor. *Jean Bénazet.*
by his Attorney. *W. Hadden*

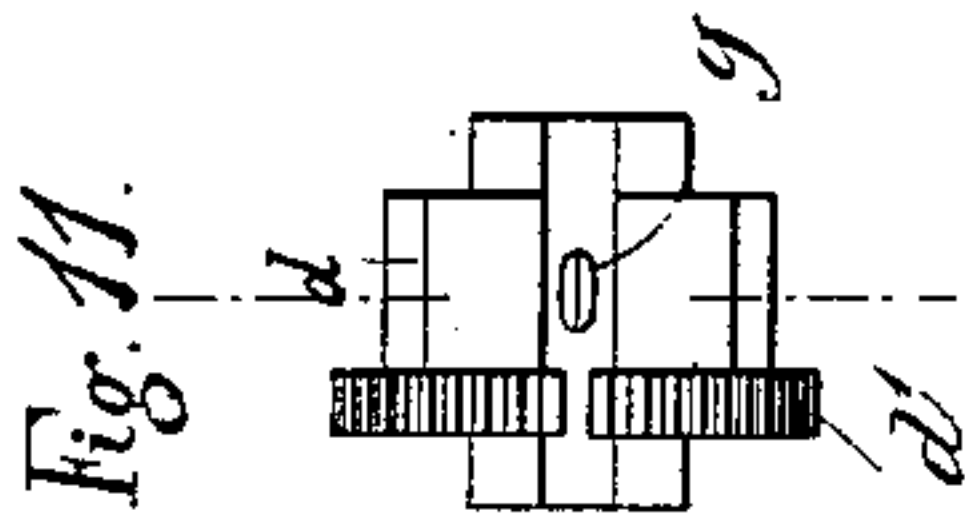
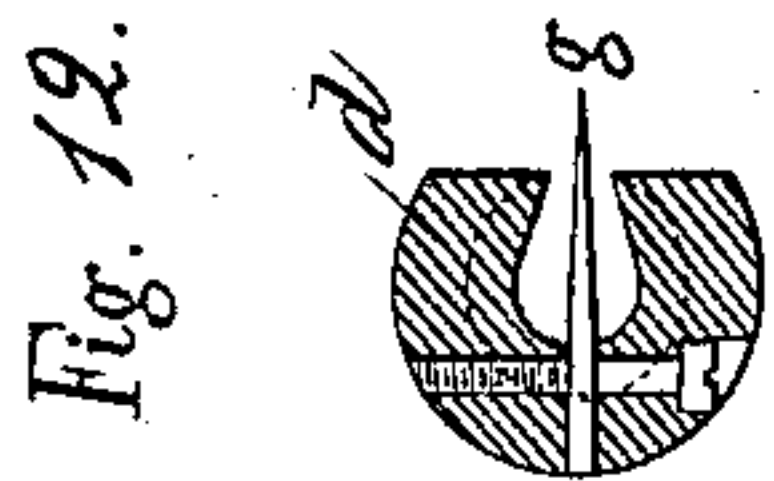
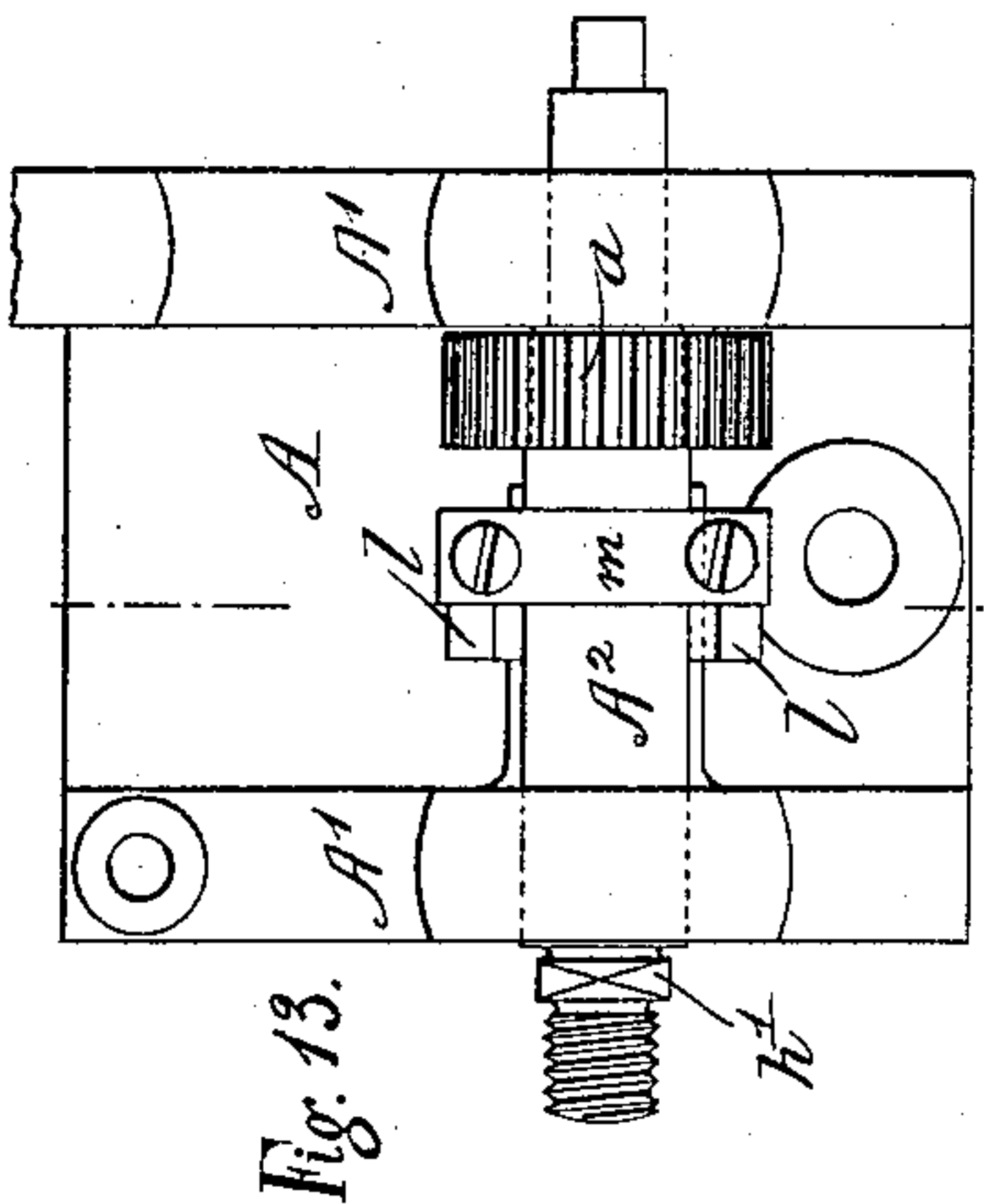
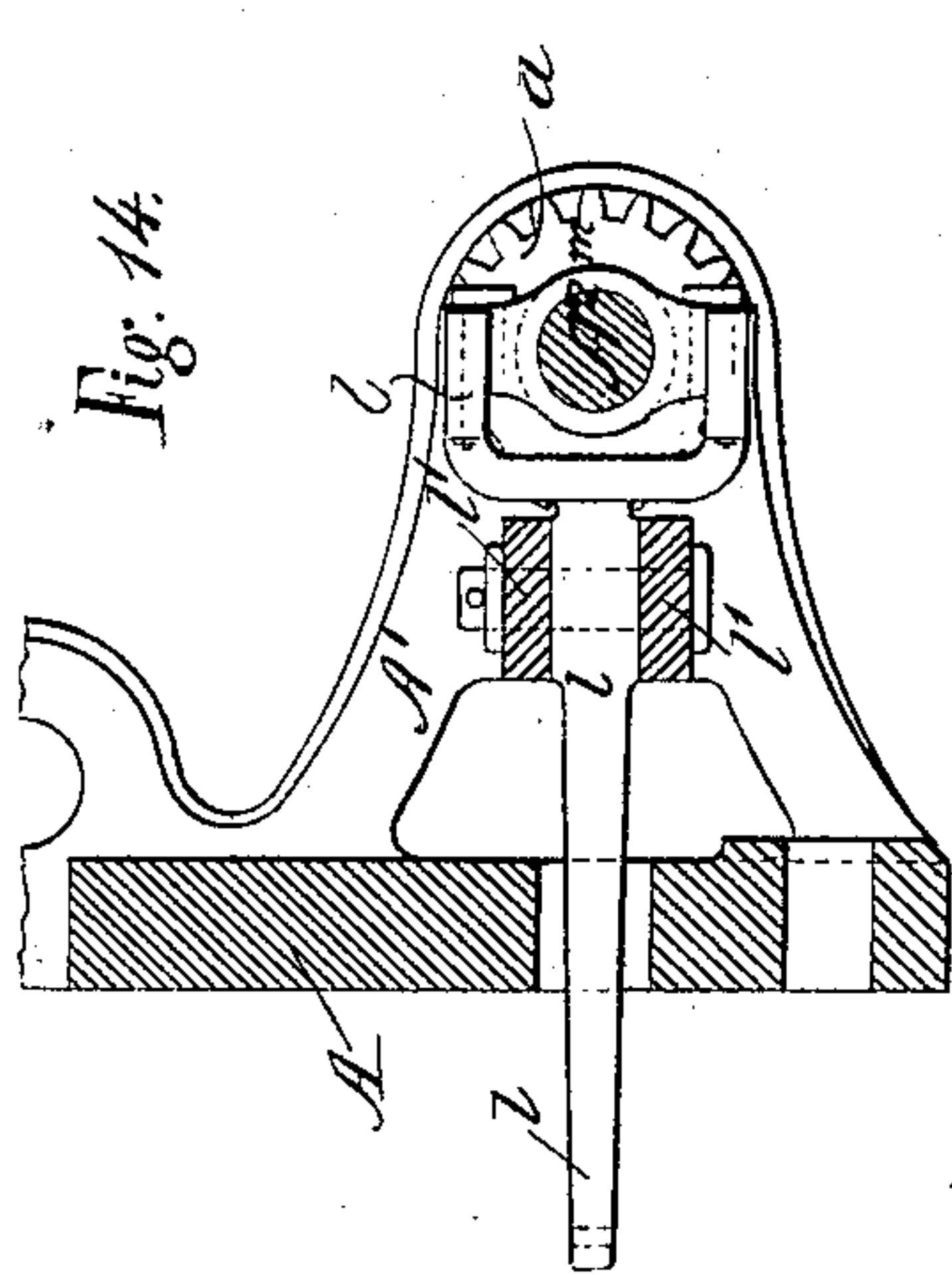
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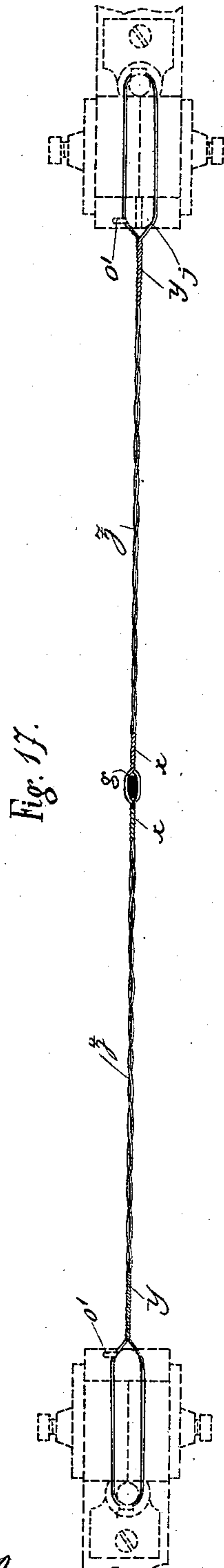
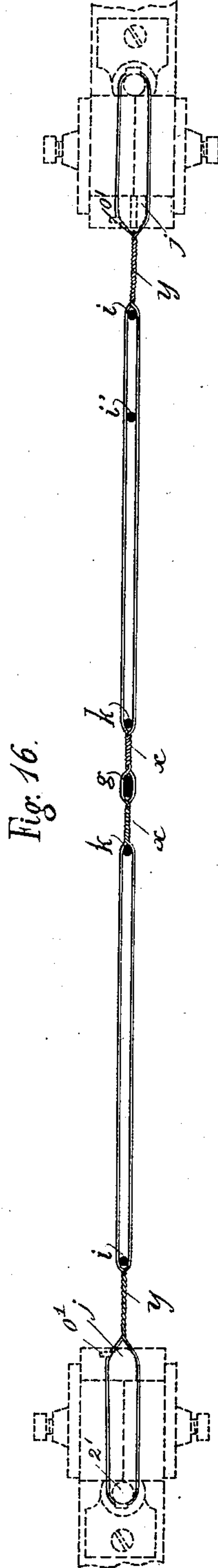
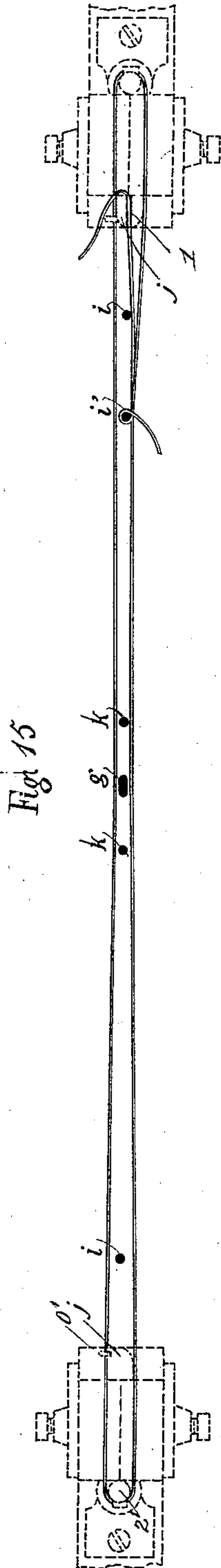
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Al. Melhuish
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Inventor. *Jean Bénazet*
by his Attorney. *A. Hadden*

UNITED STATES PATENT OFFICE.

JEAN BÉNAZET, OF RHEIMS, FRANCE.

HEDDLE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 407,325, dated July 23, 1889.

Application filed June 11, 1888. Serial No. 276,751. (No model.) Patented in France August 26, 1886, No. 178,175.

To all whom it may concern:

Be it known that I, JEAN BÉNAZET, a citizen of the French Republic, and residing at Rheims, in France, have invented an Improvement in Heddle-Making Machines, (for which I have obtained Letters Patent in France, No. 178,175, dated August 26, 1886,) of which the following is a specification, reference being made to the annexed drawings forming part
10 therewith.

The object of this invention is to construct a machine for making wire heddles, more especially such as is represented in Figure 17 of the drawings; and to this end it consists in
15 the relative arrangement, construction, and combination of parts, as hereinafter described, and pointed out in the claims.

In the drawings, Fig. 1 is a front elevation of the improved machine, certain parts
20 being omitted for clearness of illustration. Fig. 2 is a plan view thereof, showing also the levers D and P and rods C and *t t*, the parts omitted in Fig. 1. Fig. 3 is a side elevation, and Fig. 4 a plan view, of the central puppet
25 supporting the eye-forming mechanism for the heddle. Figs. 5, 6, and 7 are respectively front elevation, end elevation, and plan view of one of the end-twister blocks. Figs. 8, 9, and 10 are respectively end elevation, front
30 elevation, (partly in section,) and plan view of one of a pair of adjustable puppets placed laterally of the central puppet, and holding each a pin, which limits the twisting of the wire near the loops at the ends of the heddles
35 during the first torsion of the wire. Figs. 11 and 12 are detail views, plan, and section of the rotary central eye forming and twisting block hereinafter referred to as the "eye twister-block." Figs. 13 and 14 are respectively
40 plan and sectional views of one of the head-stocks supporting the spindles on which the end-twister blocks are carried. Fig. 15 illustrates in plan view the position of the wire before twisting. Fig. 16 shows the same
45 after the first twisting. Fig. 17 shows the same after the second twisting—that is to say, the finished heddle.

A is the base or frame of the machine, of suitable shape for carrying the various parts.
50 On the ends of the base A are the stationary head-stocks or standard-bearings A' A' for

supporting the two spindles A² A², which carry the end-twister blocks. The base-plate *h* of the twister-block is elbowed in the manner shown and fixed upon the squared part *h'*
55 of the spindle A² by the nut *h*², Figs. 1 and 13. The spindles A² are movable endwise in their bearings in the head-stocks for a limited distance, their outward throw being limited by the abutting of the plate *h* against the
60 face of the head-stock.

In a suitable position in the front of the machine is pivoted the hand-lever D, which is connected by the bowed rods *b t*, respectively, with the spindles A² A² in the manner
65 shown, so that the two spindles may be moved inward or toward each other by movement of the lever D. The spindles are held in their extreme outward position by the springs *n* operating on levers *l*, pivoted on lugs *l'* in the
70 head-stocks and terminating in forks which butt against lugs or collars *m*, fixed on the spindle. The tension of the springs *n* is regulated by the screw-threaded bolts *n'* and thumb-nuts *n*², Fig. 1.
75

The devices for holding that part of the wire which is to be formed into a loop at the end of the heddle, and which I have termed the "end twister-block," are shown in Figs. 1 and 2, and on a larger scale in Figs. 5, 6, and
80 7. The elbowed plates *h* are flanged in the manner shown at the sides and front to form a chamber for reception of the wooden blocks *r r*, having curved faces, as shown, so that the wire resting thereon may be twisted
85 somewhat more than is necessary at the loop, and the recoil of the wire after twisting may be compensated so that the loop shall eventually issue quite straight and without twist in itself. The position of the blocks *r r* may
90 be exactly regulated by the set-screws *r'* in the base and sides of the plate *h*. On the front of the plate *h* is the projecting finger *j*, which extends across the line of the axis of the spindle A². One of the fingers *j* carries
95 a slot *l* for receiving the end of the wire, Fig. 15. The finger *j* on the other end twister-block need not be so slit. The function of the finger *j* is to shape the inner end of the loop at the end of the heddle, and it is therefore shaped
100 accordingly—that is to say, preferably semi-cylindrical on its outer face. Behind the

blocks r , also extending athwart the line of the axis of the spindle A^2 , is the finger $2'$, fixed in a block adjustable by a set-screw on the plate h in any convenient way, so that the distance between the fingers j and $2'$ may be adjusted according to the length of the loop to be made. The shape of the finger $2'$ is according to the shape to be given to the end of the loop. The finger carries the projecting part 4 to prevent the wire from springing off the loop during the twisting. To prevent the wire springing off the finger j , I provide on one side the guard o , a fixed projecting pin, and on the other side the guard o' , the latter being a pin sliding in a socket in the finger j , and connected to the spring $3'$, which holds it projected from its socket. The spring $3'$ extends upward for disengagement by hand when releasing the finished heddle from the machine.

Between the two twister-blocks, at a convenient position on the base of the machine, according to the position of the eye in the heddle, is the mechanism for forming the eye. It comprises the rotary twister-block d , Figs. 11 and 12, formed with the pinion d' , and journaled in the puppet e in the axial line of the spindles $A^2 A^2$. The block d is recessed toward the center, and a corresponding passage-way is cut through the web of the pinion d' to admit the wire to lie in the recess. In the recess is fixed the pin g , the shape of which in cross-section corresponds to the shape of the eye to be formed by it. The pin g may tongue into the block d and be fastened by a screw, as shown, in Fig. 12. The bearings in the puppet are also so made as to admit the wire to lie along the axial line of the twister-block d . To revolve the twister-block, the pinion d' gears with a second pinion c , and the latter also with the spur-wheel b on a shaft B , journaled in the base of the machine, and carrying, also, the spur-wheels $a' a'$, gearing with pinions $a a$ on the respective spindles $A^2 A^2$. A fly-wheel and crank-handle are provided for revolving the shaft. By this movement the twister-block d will be revolved in a contrary direction to the end twister-blocks, and the wire stretched between would be uniformly twisted between the eye and the loops. Since, however, near the eye and the loops it is advisable to twist the wire tighter than elsewhere along the heddle, I have provided devices by which the twisting may be limited to a certain distance each side of the eye and a certain length next to the loops at the end. Having twisted these parts I can then give a slight twist to the rest of the heddle. The said devices comprise pins or fingers to be set between the wires, and which I term "twist-limiting pins," and mechanism for bringing the pins into and out of action. The pins for limiting the loop-twist are carried by the adjustable puppets $E E$, respectively, Fig. 1. The shape and construction of that on the right are shown in Figs. 8 to 10 on an enlarged scale. p is the base-plate sliding between

the guides p^5 , fixed by screws adjustably or otherwise to the base A . To the outer end of the plate p is hinged the upright frame p' , carrying in guides a sliding plate p^2 , on the upper end of which is fixed the limiting-pin i . The plate p^2 may be lifted or lowered by the lever p^3 , the slot p^4 of which engages on a gudgeon p^5 , fastened on said plate p^2 . On the rear of the plate p is fixed the upright frame p^6 , which carries in a similar manner the pin i' , which is raised and lowered in the same way by a lever p^8 , and which serves for fastening the end of the wire of which the heddle is to be made. The frames p' and p^6 are connected above by the bent spring p^9 , so that the frame p' may give backwardly toward the rigid frame p^6 to allow for the pressure of the twisting between the pin i and the end twister-block.

The plate p is controlled by the screw-threaded bolt p^{10} , fastened to it and engaging in the nut p^{11} , journaled in a bearing p^{12} on the base A . The puppet E on the left differs from that on the right just described only in dispensing with the pin i' , and consequently with the construction of the frame p^6 and of the lever p^8 and means for raising and lowering that pin. The only function of frame p^6 is therefore in this case to support the spring p^9 and bolt p^{10} .

Similarly the eye-twist-limiting pins $k k$, Figs. 3, 4, 15, and 16, are carried on plates k^4 , vertically guided in the sides of the central puppet e , and are controlled by the levers f , the slots k^2 of which engage on gudgeons k^3 , fixed to said plates k^4 . The bar C , fixed to the ends of the levers f , extends right and left and passes through slots in the ends of the levers $p^3 p^3 p^8$, so that all the pins $i i' k k$ may be simultaneously thrown into or out of action by moving the handle P of said bar C .

To prevent the wire springing off the pins $k k$, the sliding guard-plates s are provided, as in Fig. 3, slotted at the ends to embrace the wire. They are connected to the levers f by links $s' s^2$ and lever s^3 , so as to be operated with said pins $k k$. Springs $u u$ hold the bar C in the position given to it.

In manufacturing a wire heddle with this machine, the end of the wire is passed through the slot 1 in the finger j , thence along into the eye twister-block around the opposite end twister, back through the eye twister-block around the other end twister, and twisted on the pin i' , the pins $i i' k k$ having been all raised into action and projecting between the two strands of the wire, as shown in Fig. 15. One revolution of the shaft A will form the eye-twists $x x$ and the loop-twists $y y$, Fig. 16. The pins $i i' k k$ are now lowered and another revolution given to the shaft A , by which the main twists $z z$ are made. By drawing the spindles $A^2 A^2$ together by hand-lever D and loosening the guards O' by drawing back the springs $3'$ the finished heddle may be removed from the machine.

I claim as my invention—

1. The combination, with a rotary end twister-block, of a finger adapted to be moved athwart the line of the heddle and adjustable to and from said block.
- 5 2. The combination of two live-spindles whose axes are in line, said spindles being movable in the line of their axes to and from each other, with twister-blocks on said spindles and an eye-forming mechanism between
10 said spindles.
3. The combination, with the spindles $A^2 A^2$, of levers $l l$, and springs controlling said levers, rods $t t$, and hand-lever D , substantially as and for the purpose set forth.
- 15 4. The combination, with the spindle A^2 , of the elbowed plate h , the fingers j and $2'$ on said plate h , the blocks r , having curved surfaces, as set forth, and set-screws r' , for adjustment of said blocks, substantially as described.
- 20 5. The combination, with the end twister-blocks, of the movable puppets E and the pins i on said puppet.
6. The combination, with the end twister-block having the slit finger j , of the movable puppet having the pins i and i' , substantially as and for the purpose set forth. 25
7. The combination, with the pins $i i$ and twister-blocks, of springs tending to drive said pins $i i$, respectively, toward said twister-blocks, for the purpose set forth. 30
8. A puppet comprising the base-plate p , the hinged frame p' , the rigid frame p^6 , the spring p^9 , the plate p^2 , sliding in said frame p' , the pin i on said plate p^2 , and the lever p^3 , for the purpose set forth. 35
9. The combination, with the pins k , of the guards s to said pins, the levers $f s^3$, and links $s' s^2$, for operating said guards and pins.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 40

JEAN BÉNAZET.

Witnesses:

ANTONY BERTHIER.

JOSEPH EMILE COURTEAUX.