

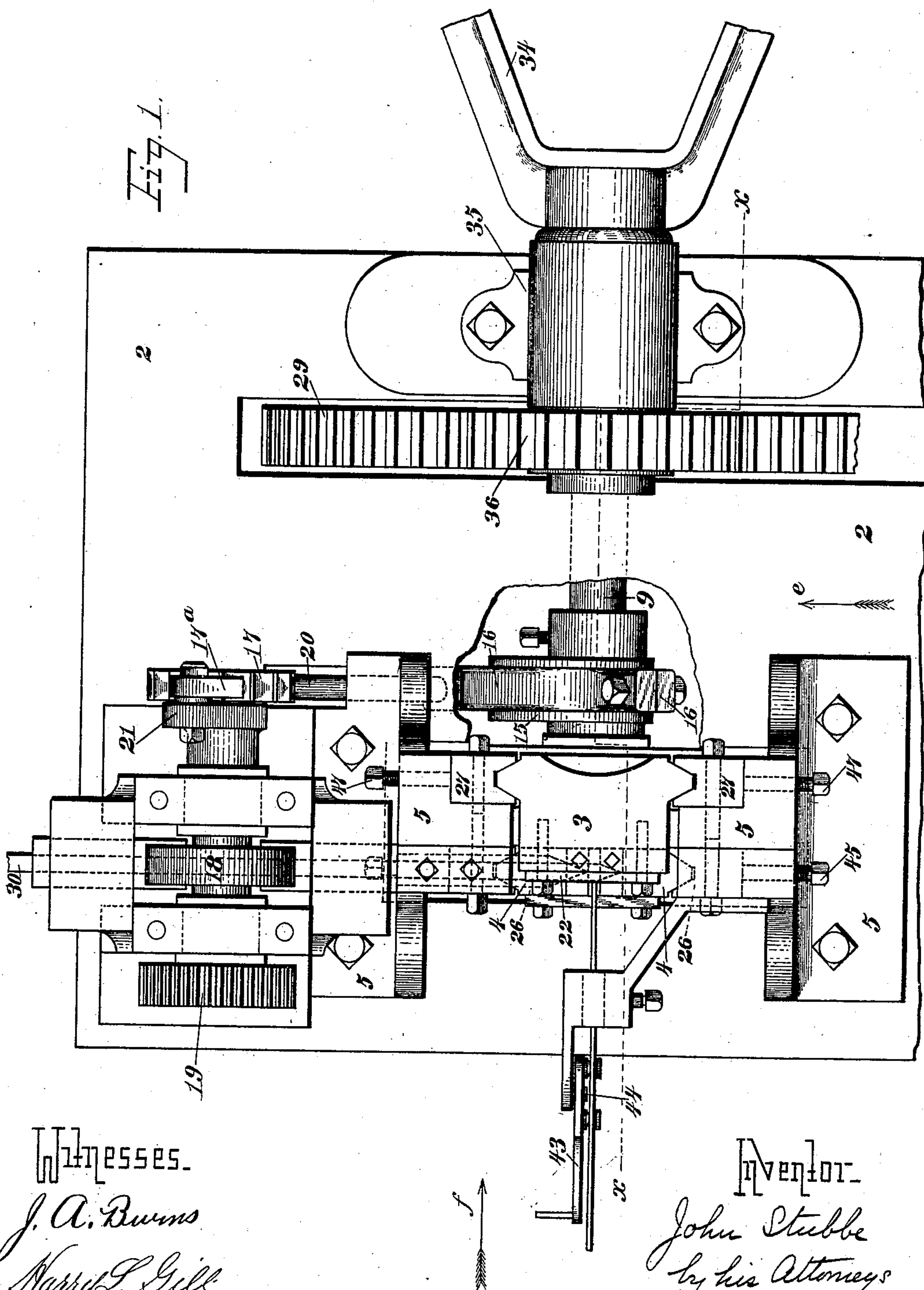
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8 Sheets—Sheet 1.

J. STUBBE.
WIRE BARBING MACHINE.

No. 333,087.

Patented Dec. 22, 1885.



Witnesses.

J. A. Burns
Harry L. Gill

Inventor.

John Stubbe
by his Attorneys
Bakerwell & Kerr

(No Model.)

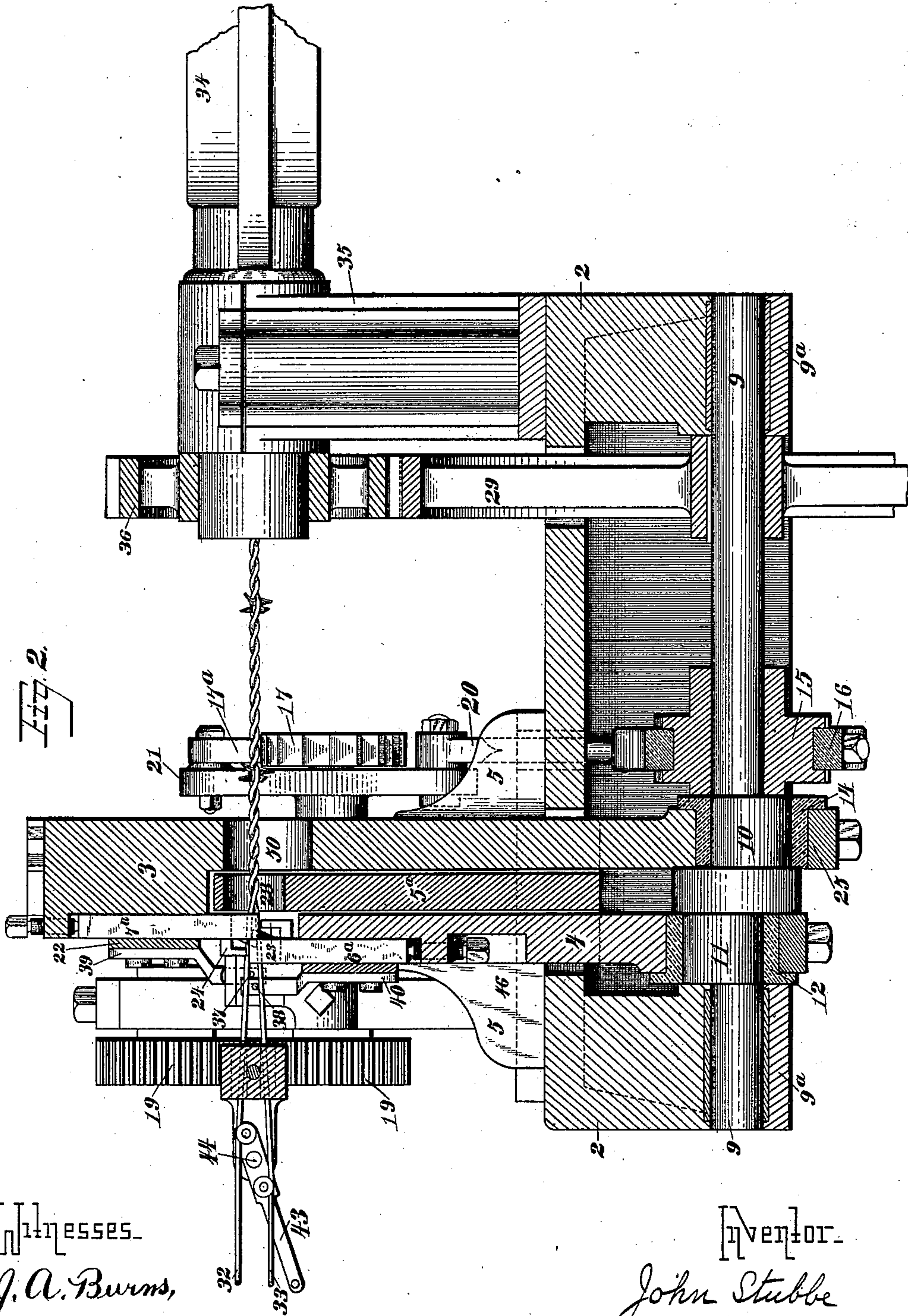
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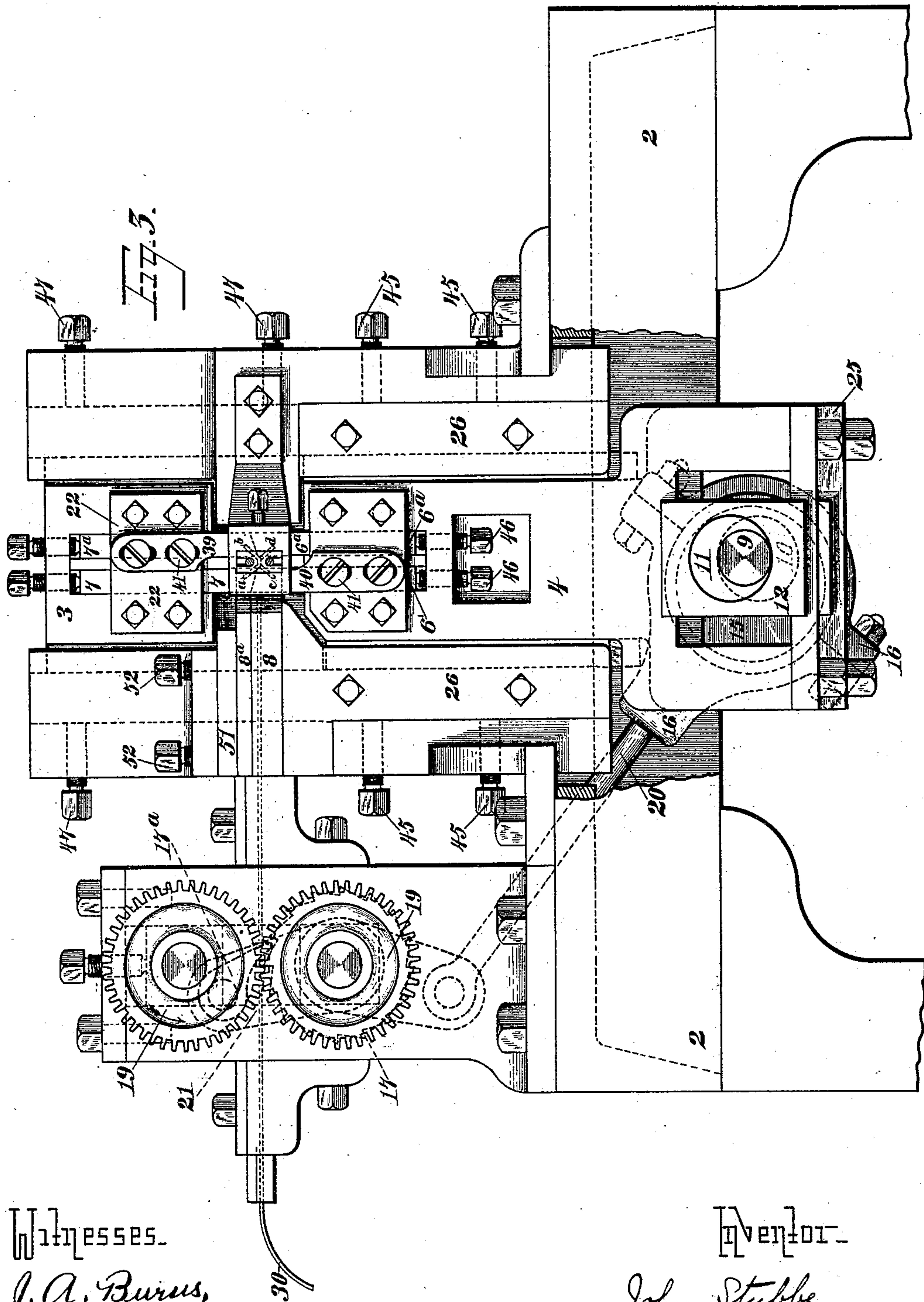
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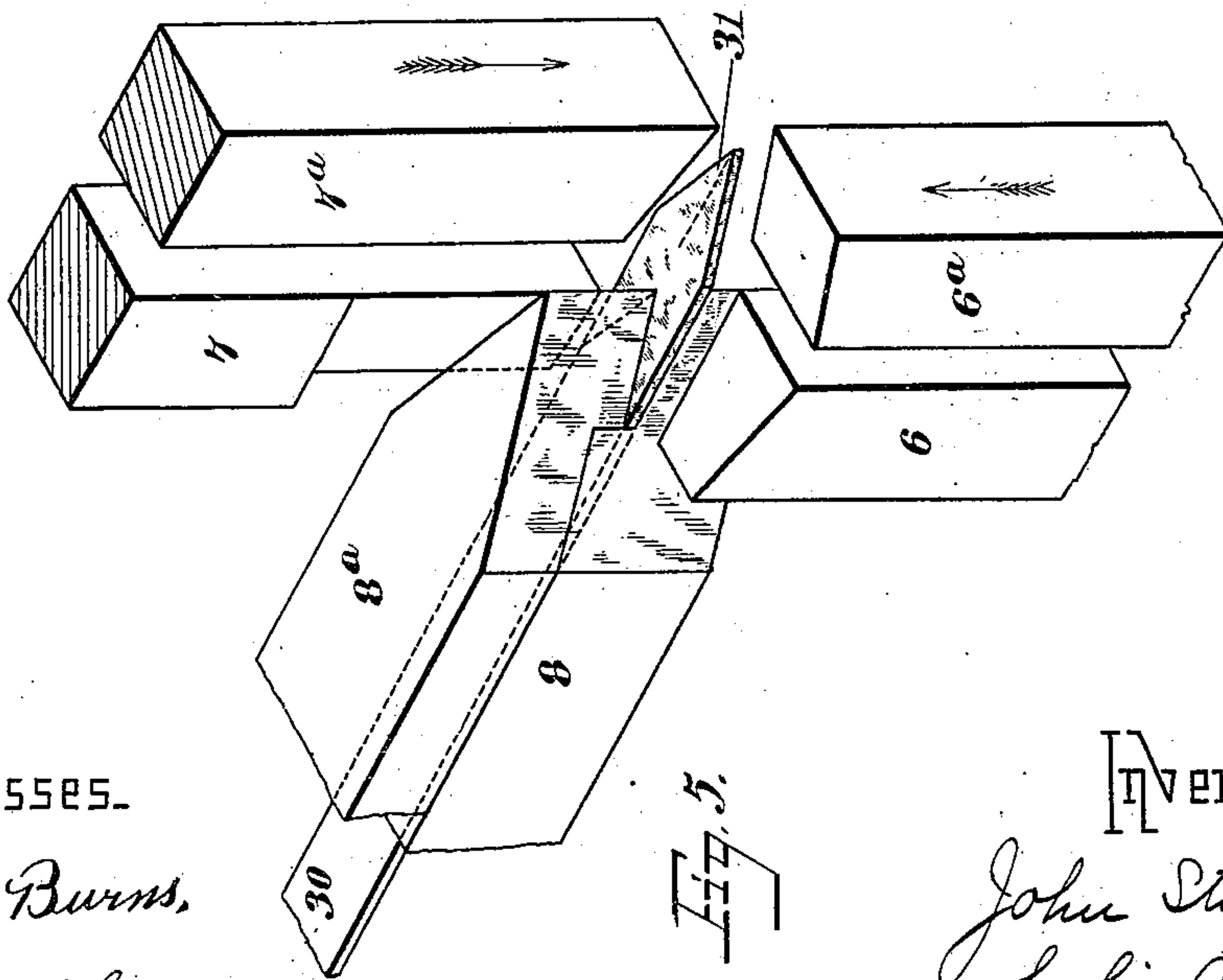
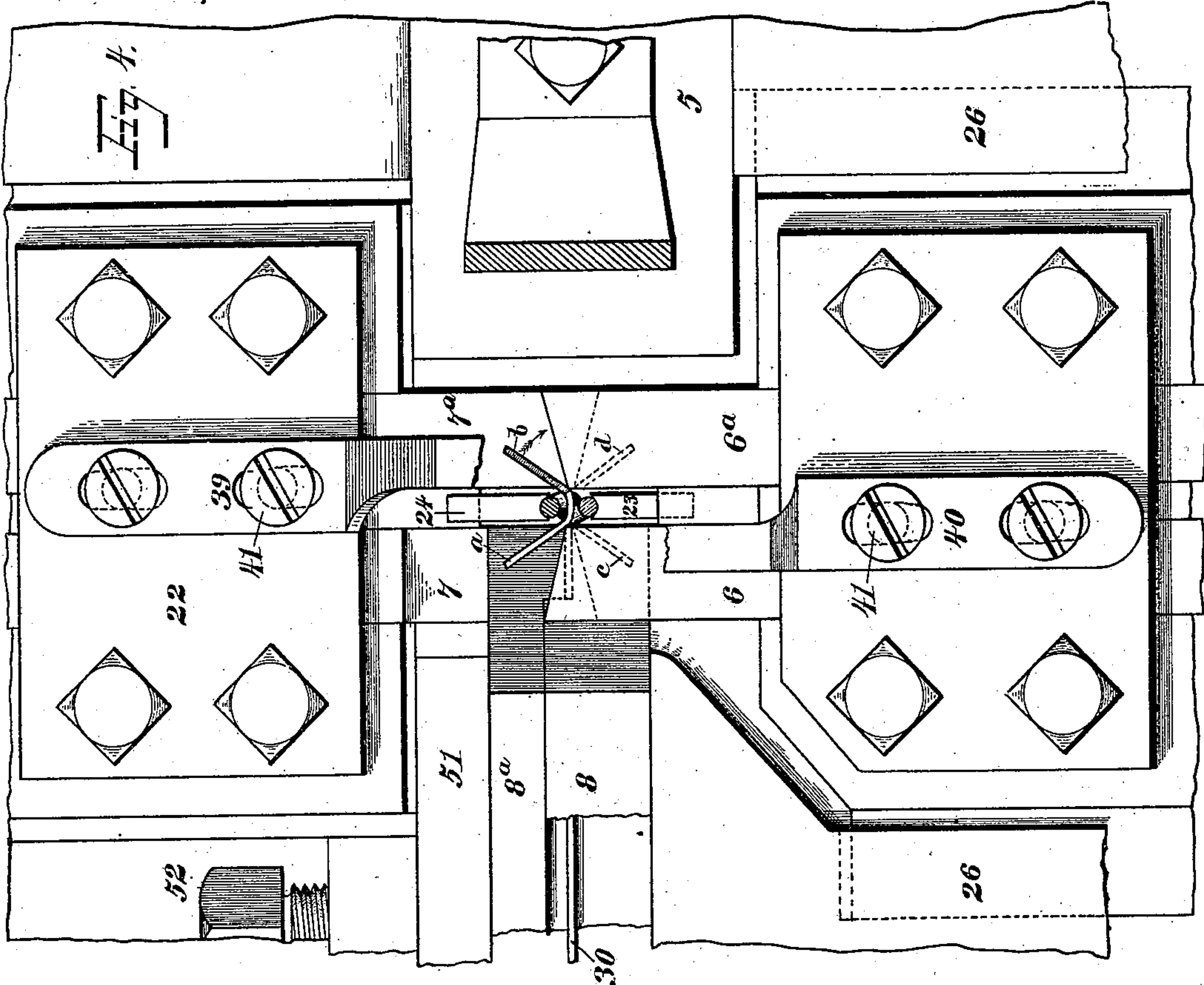
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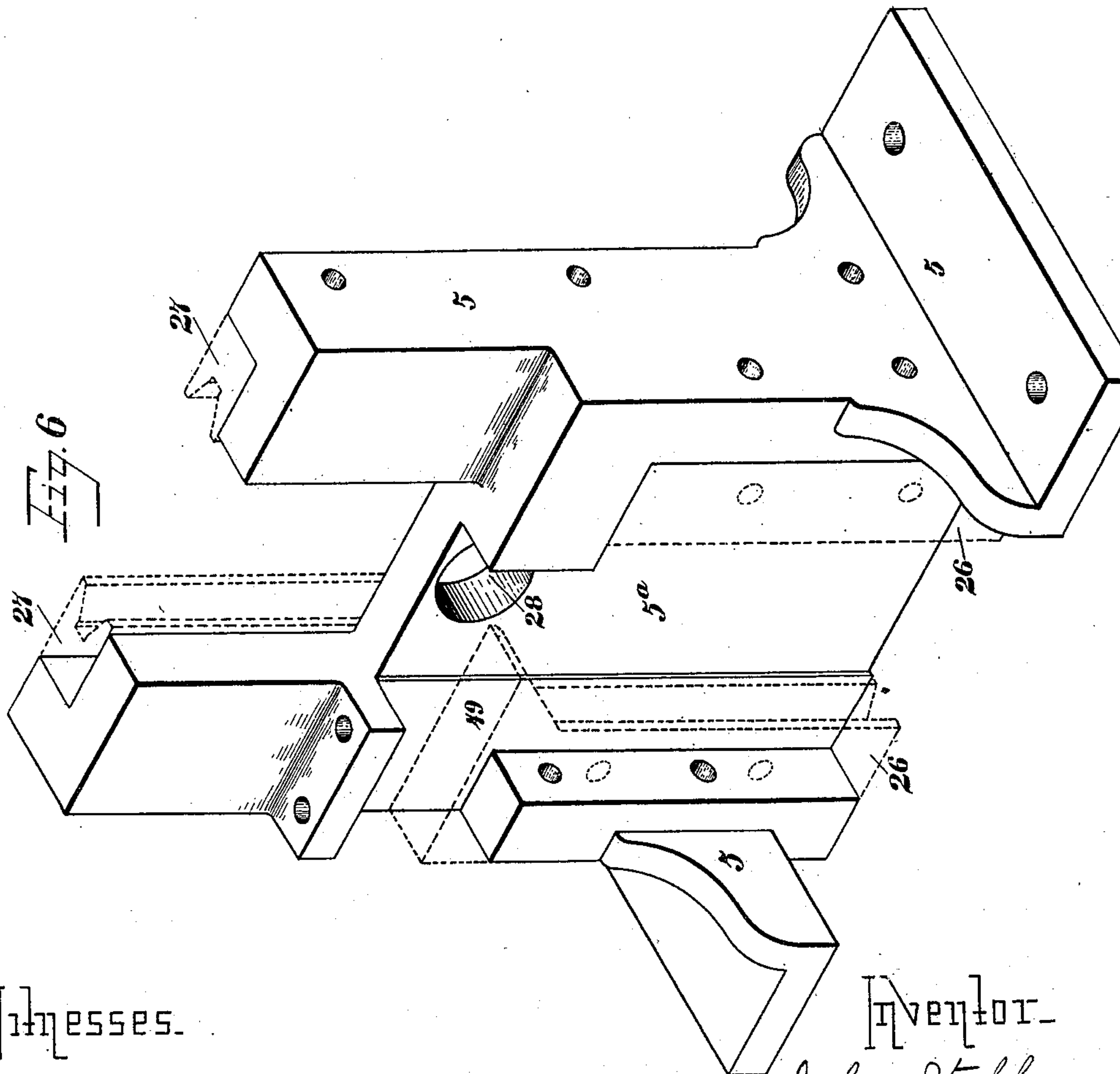
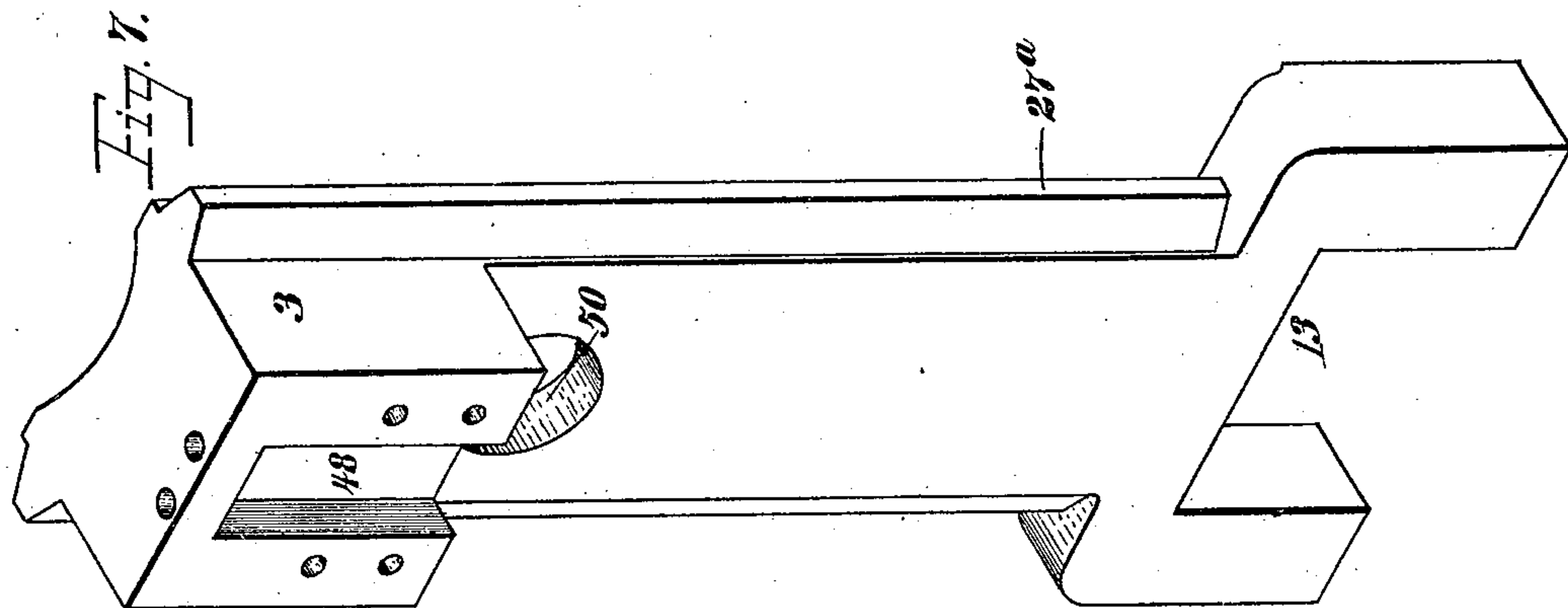
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(No Model.)

8 Sheets—Sheet 6.

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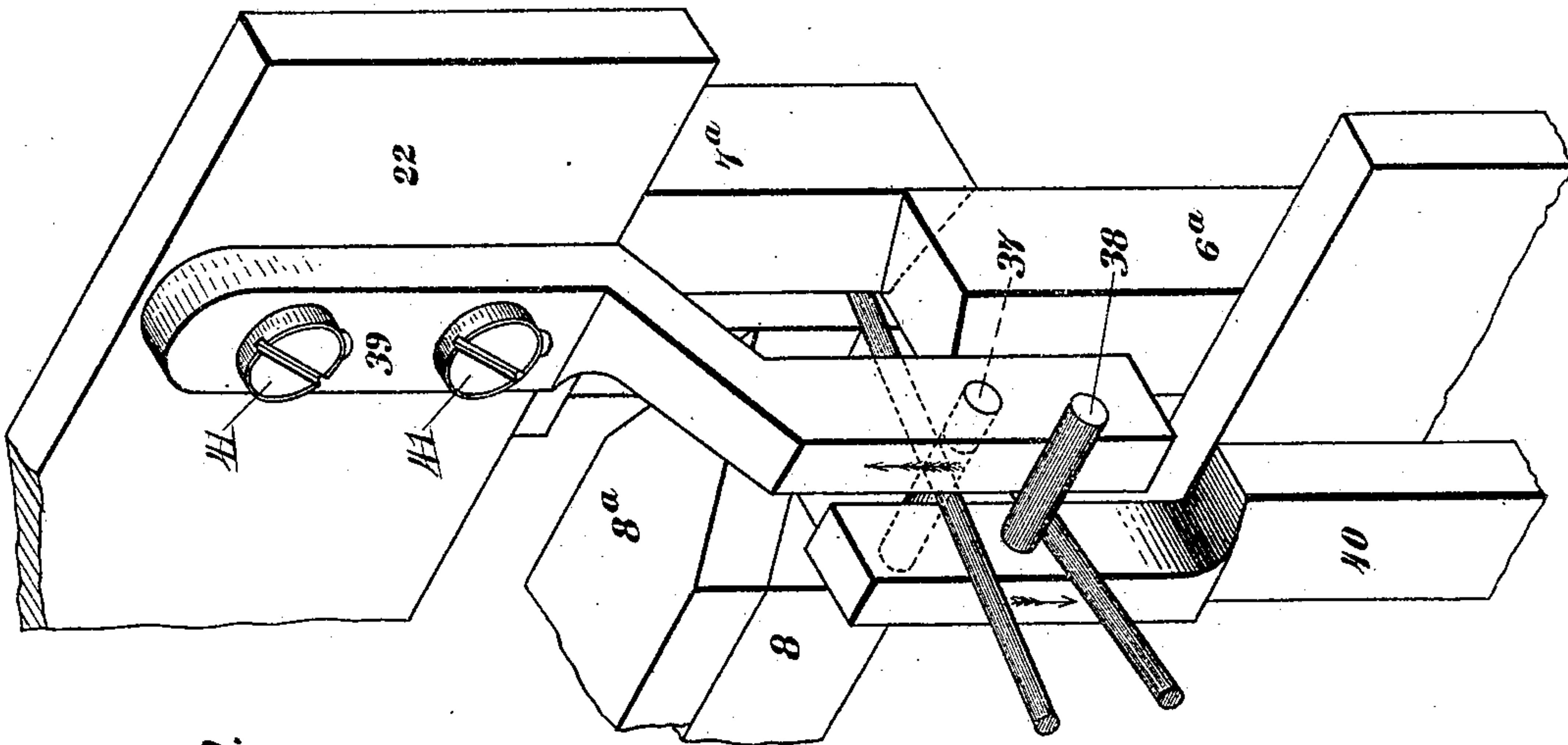


Fig. 9.

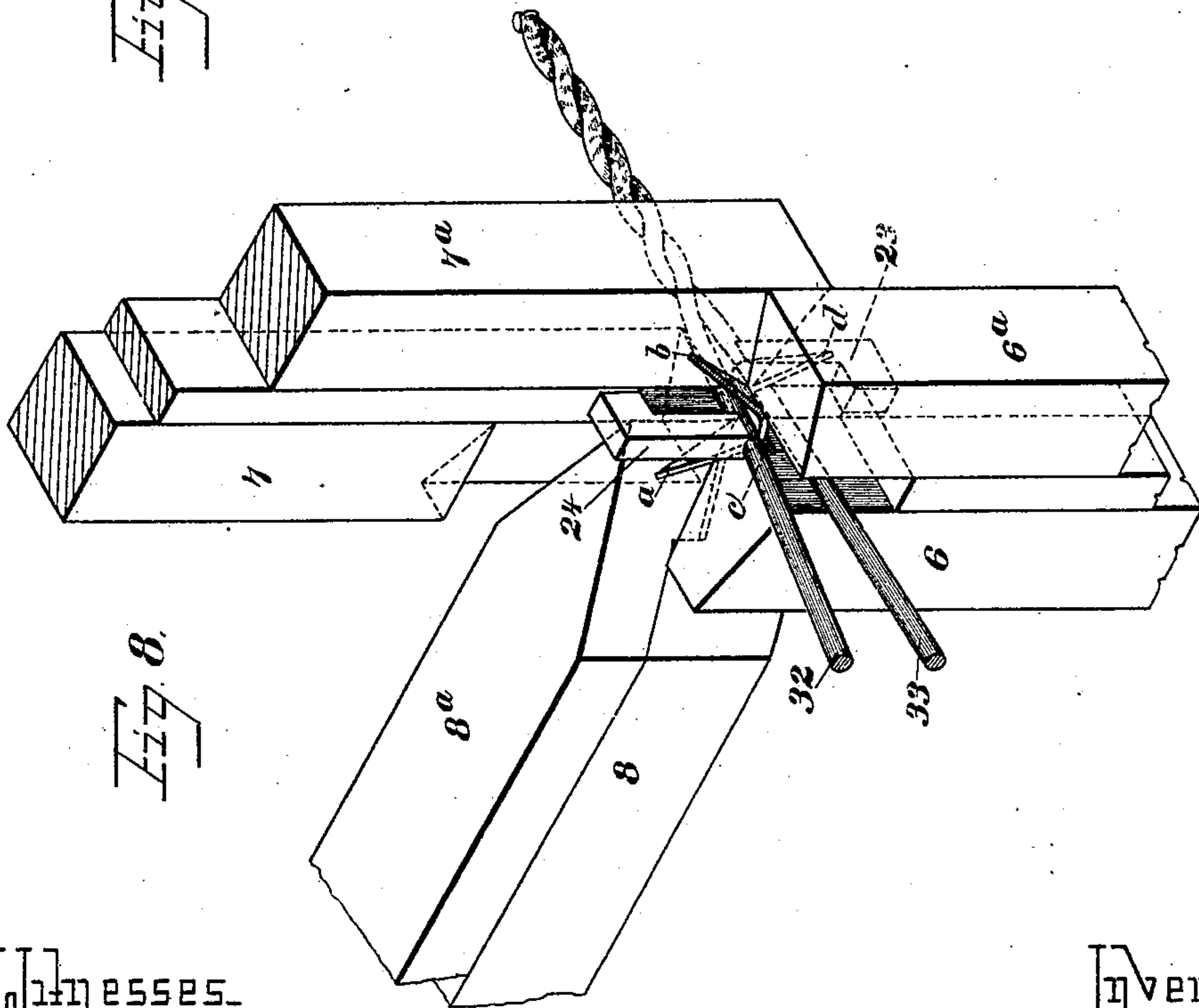


Fig. 8.

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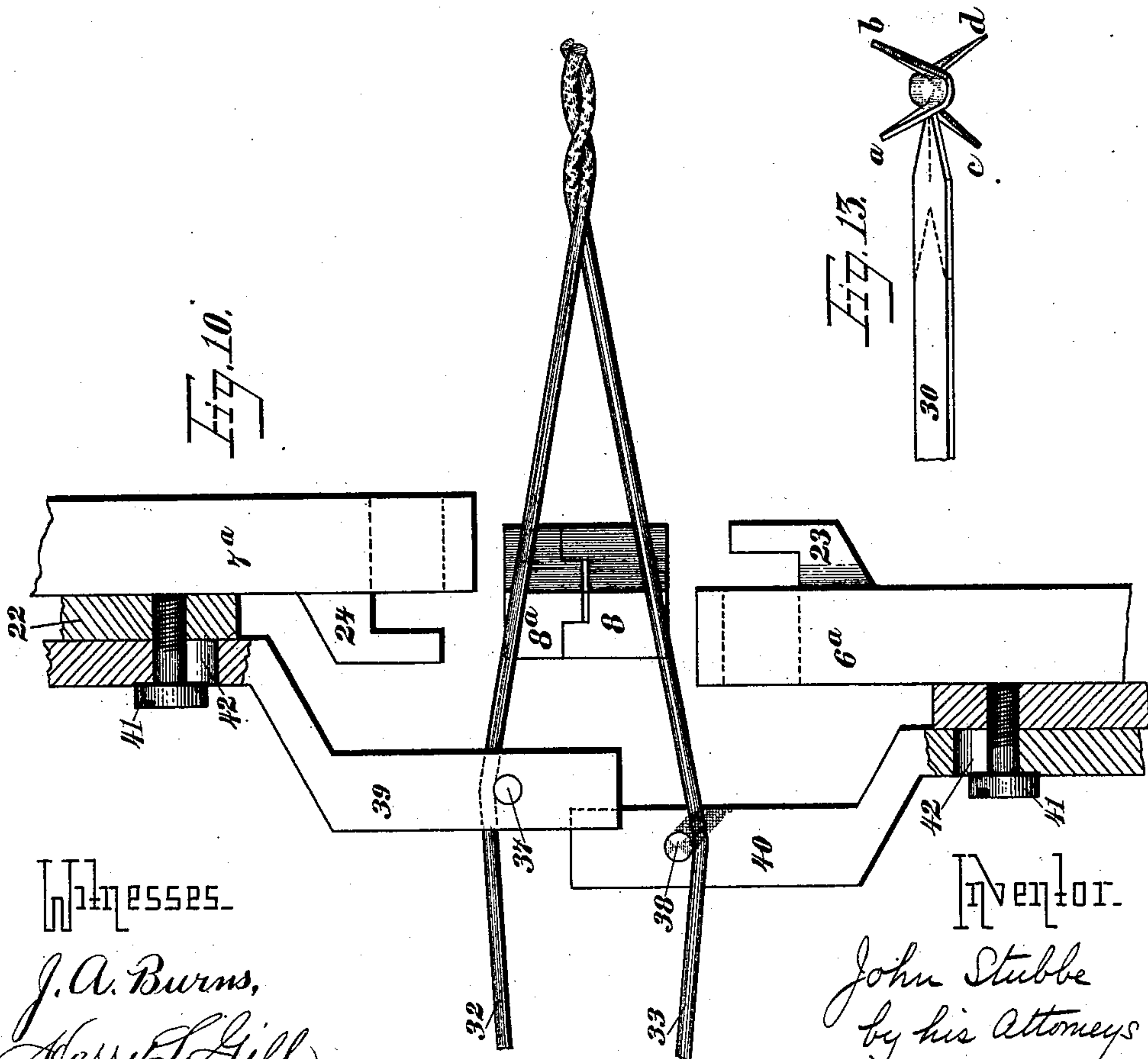
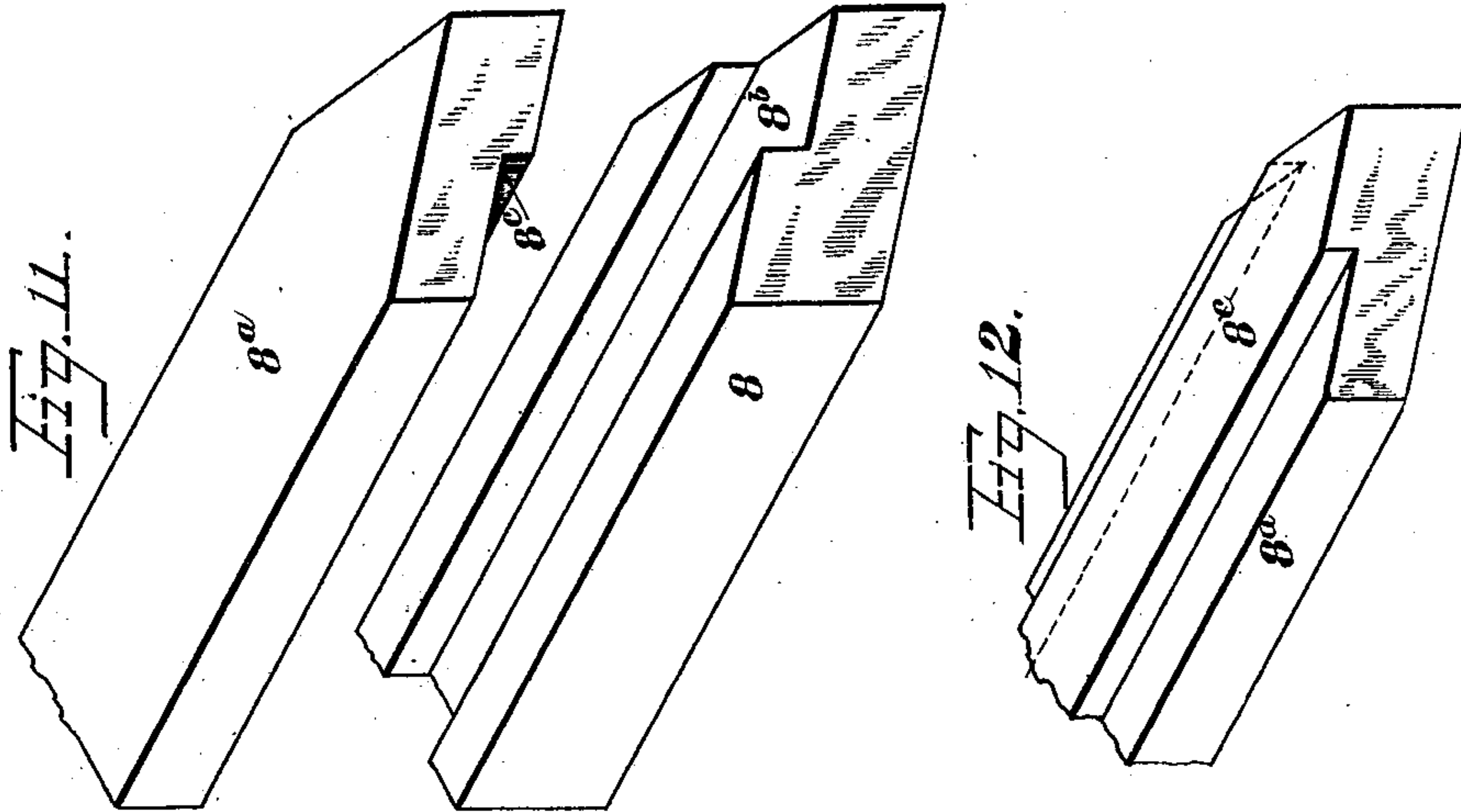
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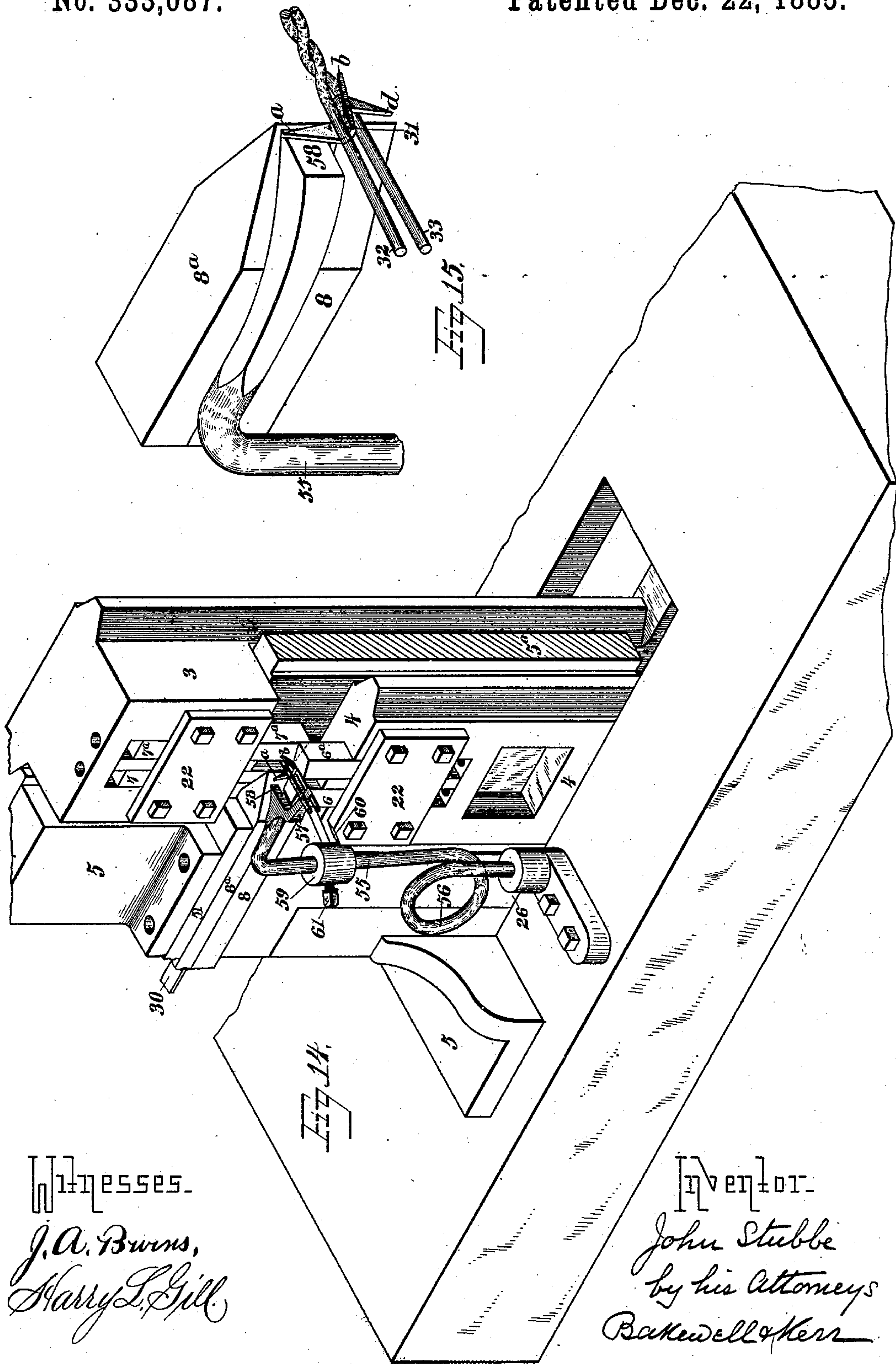
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UNITED STATES PATENT OFFICE.

JOHN STUBBE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE PITTSBURGH STEEL FENCING COMPANY, OF SAME PLACE.

WIRE-BARBING MACHINE.

SPECIFICATION forming part of Letters Patent No. 333,087, dated December 22, 1885.

Application filed October 7, 1885. Serial No. 179,191. (No model.)

To all whom it may concern:

Be it known that I, JOHN STUBBE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Wire-Barbing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

The object of my invention is to simplify, cheapen, and better the manufacture of that class of barbed wire in which the barb-blanks are cut from a metal strip and inserted between two or more strand-wires, the latter being twisted to hold the barb in place.

I will now describe my invention with reference to the accompanying drawings, in which like symbols of reference indicate like parts wherever they occur.

Figure 1 of the drawings is a plan view of so much of the machine as is sufficient to illustrate my invention. Fig. 2 is a vertical longitudinal section thereof on the line *xx* of Fig. 1, looking in the direction of the visual arrow *e*. Fig. 3 is an end elevation of Fig. 1, seen in the direction of the arrow *f*. Fig. 4 is an enlarged front view of the knives and adjacent parts shown in Fig. 3, illustrating the manner of shearing and shaping the barb. Fig. 5 is a perspective view of the knives and guide-die, showing their relative positions after the barb-blank has been fed through the guide-die and is ready to be cut. Fig. 6 is a perspective view of the standards in which the knife carriers or heads are mounted. Fig. 7 is a perspective view of the upper knife-carrier. Fig. 8 is a perspective view of parts, showing the barb after it has been severed and adjusted between the strands and just before the separation of the knives to release the barb. Fig. 9 is a perspective view showing the devices for separating the cable-strands to permit insertion of the barb. Fig. 10 is a vertical section of Fig. 9, showing the separating devices spread to their fullest extent. Fig. 11 is a perspective view of the guide-die with its component parts disunited for clearness of illustration. Fig. 12 is a bottom perspective view of the upper part of the die shown in Fig. 11. Fig. 13 is a perspective view of a barb when sheared and shaped. Fig. 14 is a front perspective view of parts of the machine

shown in Fig. 3, together with a device (not represented in Fig. 3,) for spreading the strand-wires and releasing the barb from the knives and die after the shearing operation. Fig. 15 is a perspective view of a part.

In the drawings, (see especially Fig. 2,) 2 represents the bed-plate of the machine. Mounted upon it are vertical standards 5, which support and form ways for the knife heads or carriers 3 and 4, to which the knives or dies 6 6^a 7 7^a, used in shearing and shaping the barb-blanks, are fixed. A rotary shaft, 9, is mounted underneath the bed-plate 2 in suitable bearings, 9^a, and cams 10, 11, and 15 are affixed to this shaft, either cast integrally therewith or keyed thereto. The cams 10 and 11 are employed in operating the knife-heads 3 and 4. The cam 10 is a disk mounted eccentrically on the shaft 9, and is surrounded by a rectangular cam-yoke, 14, which is fitted within a hollow oblong guide-box, 13, at the bottom of the knife-carrier 3, so as to be capable of sliding laterally therein. (See Figs. 2, 3, and 7.) This is a well-known mechanical device, and it is clear that as the shaft rotates, the cam 10, causing its yoke 14 to reciprocate within the box 13, will impart a vertical reciprocation to the knife head 3 within its ways.

As a matter of construction, the oblong space 13 is preferably made by recessing the bottom of the knife-head, as shown in Fig. 7, and bolting a retaining-brace, 25, over the bottom of this recess. (See Fig. 3.) The knives 7 7^a, held by the head 3, are the upper knives, and operate downward in a vertical direction. The knives 6 6^a, which are fixed to the head 4, are the lower knives, and operate vertically toward the upper knives. The cam 11, which moves the knife-head 4, is provided with a sliding yoke, 12, and an oblong box affixed to the head, substantially similarly to the arrangement of the cam 10, before described. The greatest eccentricities of the cams 10 and 11 are situated on the shaft 9, diametrically opposite to each other, so that as the head 3 moves downward the head 4 will move upward, and vice versa. The third cam, 15, which is affixed to the shaft 9, consists, also, of an eccentric disk, and is sur-

rounded by a circular cam-yoke, 16, preferably made in two sections bolted together, as shown in Fig. 3. This cam is used to actuate the rolls 18, which feed the barb-strip into the machine. These rolls are journaled one above the other, with their axes parallel to the shaft 9, and are connected by gear-wheels 19, meshing with one another. A ratchet-wheel, 17, is affixed to the shaft of the lower gear-wheel, 19, and is driven by a pawl, 17^a, which is pivoted to the free end of a rocking arm, 21, the other end of which is pivoted to the extremity of a connecting-rod, 20. The latter is joined to the cam-yoke 16, and the rocking arm 21 is journaled loosely at an intermediate point to the axis of the lower feed-roll. As the cam 15 revolves once, it will once move the pawl 17^a forward, thus causing it to bite upon the ratchet and to turn the feed-rolls through a given arc, and will also retract the pawl, in readiness for another bite. During the retraction of the pawl the feed-rolls remain still, and have therefore equal alternate periods of motion and rest. The length of the strip, from which the barbs are cut, fed during each forward rotation of the feed-rolls is equal to the length of the barb-blank, and is determined by fixing the diameter of the feed-rolls or the number of teeth on the ratchet 17 and the length of stroke of the pawl 17^a. In Fig. 3 the pawl is shown in dotted lines partially retracted. The feed-rolls are about the same in diameter as the diameter of the pitch-line of their gear-wheels, so that they may grasp the interposed barb-strip. The upper feed-roll (designated by the reference-figure 18,) is shown in Fig. 1. The cams 10, 11, and 15 are timed so that the knife-heads will move synchronously, and that the barb-feeding mechanism will feed the strip during about the latter half of the period of separation of the knives and during about the first half of their approach, and that it will be at rest during the remaining period of motion of the knives. In its path from the feed-rolls 18 to the knives which shear and shape the barb-blank the barb-strip passes through a horizontal slot in a fixed guide-die, 8 8^a, which is shown in perspective in its proper relative position to the moving knives in Figs. 5 and 8. In Fig. 11 the parts of this die are shown separated for clearness of illustration. The lower part, 8, is an oblong block of metal grooved superficially and longitudinally, as at 8^b, and laterally beveled to a vertical edge at the forward end. The upper section, Fig. 12, is similar in general configuration, but in place of the groove 8^b has a superficial tongue, 8^c, of less thickness than the depth of the groove. The tongue fits within the groove when the parts are superposed, as in Fig. 5, and affords a narrow intermediate slot for passage of the barb strip 30. One of the upper moving knives, 7, is so set in its head 3 that its cutting face and edge move vertically downward in contact with one side of the beveled point of the compound die

8 8^a, and one of the lower knives, 6, is so set that it moves upward in contact with the other side thereof. The other knives, 7^a and 6^a, are set adjacently to the dies 7 and 6, but in advance thereof relatively to the course of the barb-strip, and are arranged relatively to each other so that the side and cutting-edge of the one operate in cutting and bending in contact with the side and edge of the other. In other words, the inner faces of the knives 7^a and 6^a are in substantially the same vertical plane. (See Fig. 8.) The strip 30 is fed so as to project horizontally from the forward or pointed end of the stationary die 8 8^a and in the path of the moving knives 6^a and 7^a, the median line of the strip being coincident with the vertical plane of contact of these knives. Thus arranged, suppose the upper and lower knives to approach. The rear knives, 6 and 7, engaging the portion of the strip projecting from the beveled sides of the die 8 8^a, sever a blank, 31, therefrom, the form of the cut being such as to leave a V or fish-tail at the back of the blank and a corresponding point at the front end of the barb-strip, Fig. 13. Meanwhile the conjunction of the forward knives, 6^a and 7^a, upon the interposed blank (supposing the latter to be pointed, as shown in Fig. 5) will have cut a longitudinal slit extending from the point of the barb toward its center, and shown by dotted lines in the several figures, thereby dividing the blank into five parts—four cut arms or prods, *a b c d*, and an intermediate portion or body. The operation having been performed, further advance of the knives will cause each of their ends to engage its opposite arm of the barb-blank, and to bend them severally into the positions shown in Fig. 13. The bending of the blank is caused by the obtuse form of the cutting ends of the several knives shown in the drawings.

I will now explain the action of the knives in connection with the movements of the strand-wires of the fence-cable: The wires are two in number, 32 and 33, and are drawn by a suitable rotary reel at the front part of the machine from spools situate at the rear thereof. This reel is journaled within a continuously-rotary twisting device, 34, a part of which is shown in Figs. 1 and 2. The twister wraps or twists the strand-wires of the cable together upon the interposed barbs, and the reel winds up the twisted and barbed wires. They are of ordinary construction, and have not been fully illustrated in detail. The twister is journaled at its back end in an upright standard, 35, and is driven by a belt-wheel at its front end. (Not shown.) A pinion, 36, made fast to the hollow shaft of the twister, back of the standard 35, meshes with the teeth of a spur-wheel, 29, on the shaft 9. Power is thus transmitted to the latter shaft and to the other parts of the machine. The course of the strand-wires from the spools lies opposite to the pointed edge of the fixed die 8 8^a, transversely to the course of the barb-strip and between the sides of the moving knives, the

knives 7 and 6 being separated laterally from the knives 7^a and 6^a far enough to afford a space for their passage, Figs. 8, 9, and 10. The strands are held apart vertically by pins or lugs 37 and 38, which are fixed to the sides of vertical arms 39 and 40, respectively. The arm 39 is fastened to the knife-head 3 by a stud bolt, 41, which enters the head through an elongated vertical slot, 42, in the body of the arm. The spreader-arm 39 is thus made to move with the vertical reciprocations of the head 3; but the arrangement of the retaining-stud in the slot permits the head to move upward throughout the length of the latter without moving the spreader. The other spreader-arm, 40, is affixed to the lower knife-head by a stud-bolt and slot, in similar manner and for the same purpose. As the spreaders recede and approach with the movements of the heads, they will correspondingly separate the strand-wires and allow them to move toward each other.

As shown in Fig. 10, the knives and spreaders are separated to their fullest extent, and are in readiness for the interposition of a barblank between the strands. This is done by the strip-feeding mechanism before described, (which acts during the latter half of the ascent of the knives and the first half of their descent,) and then immediately the knives descend, severing the blank and bending its pointed prods upward and downward against the inclosing-strands, as illustrated in Figs. 4 and 8.

As will be apparent from the foregoing description, the function of the die 8 8^a is to guide the barb-strip into the strand-wires and to hold it while being cut by the moving knives. The descent of the knives of itself allows the strand-wires to approach more nearly to each other and to the interposed barb; but in order to immediately center and hold the barb therein there is a presser foot or plate, 24, fixed between the adjacent sides of the upper knives, 7 7^a, with its base a short distance above the cutting-edges of the knives. (See Figs. 8 and 10.) The lower part of the presser-foot, however, projects from between the sides of the knives 7 7^a, so as to be directly over the space between the lower knives, 6 and 6^a. The base of the foot 24 is preferably concave, and as the knives cut and bend the barb it will engage the upper strand-wire, 32, and will force it downward against the body of the barb, and will force part of the latter downward into the space between the knives 6 6^a, thereby assisting in the bending of the prods *a b*, and causing them to bend in right lines. If it were not for this presser-foot, the knives, while they would bend the barb, would curl the prods and make them less valuable for practical use. A similar presser-foot, 23, is arranged between the lower knives, 6 6^a, with its base projecting from the sides thereof, so as to be opposite to the space between the knives 7 7^a. The base of the latter presser-foot engages the lower strand-wire, 33, when

the knives approach in the cutting operation, and, forcing the body of the barb between the upper knives, completes and directs the bending of the prods *c d*. The presser-feet 23 and 24 are also serviceable in centering and holding the barb during its shearing and shaping. The separation of the knives, which occurs after the cutting and shaping of the barb, releases the latter, and the reel draws it forward away from the knives. During this time the twister 34, which is continuously rotary, twists the two cable-strands together toward the set barb, thus clamping it more securely in place, and as soon as the barb leaves the knives the twist of the wires will begin back of the barb as well as in front of it.

As before stated, by reason of the slots 42 and studs 41, the spreaders 39 and 40 do not begin to recede immediately with the recession of the knives, and hence the strand-wires are kept together long enough after the exit of the barb to allow the wires to twist back of it and to get a firm grasp. The purpose of this is to prevent possibility of the barb falling out of the wires when the retaining influence of the knives ceases. When the studs 41 reach the limits of their slots and retract the spreader-arms, the latter, in diverging the strand-wires, force their twist forward toward the departing barb, and tighten it so as to make a very secure union.

In Fig. 2, 43 represents a hand-lever fulcrumed at 44, and bearing upon each of the strand-wires. It is situated back of the spreading-pins 37 and 38, and its function is to provide an adjustable device for further spreading the wires whenever it is desirable to do so.

In Figs. 14 and 15 I have shown devices for freeing the barb from the guide-die 8 8^a after it has been sheared, and for spreading the strand-wires to permit insertion of the barb-strip. It consists of a rod, 55, fastened to the bed-plate of the machine, and provided with an intermediate coil, 56, or otherwise sprung, so as to give it a spring action toward the middle of the machine. This rod is situated on the side of the machine on which is the guide-die 8 8^a, has its end bent into a horizontal position, and is provided with a pointed wedge-shaped arm, 57, directed toward the space between the strand-wires. The remaining part of the end of the rod 55 is obtuse, as at 58, and is placed so that when the spring-rod is unrestrained it will lie nearly in contact with the rear beveled face of the guide-die 8 8^a. The vertical portion of the spring-arm 55 is provided with a friction-collar, 59, and the retaining-plate 22 of the lower knife-head, 4, is beveled, as at 60, the friction collar and plate being relatively so situated that as the knife-head 4 rises the beveled corner of its plate 22 will engage the collar 59, and will force the spring-arm backward away from the vertical edge of the guide die, as shown in Fig. 14. The approach of the knife-head shears and shapes the barb 31, leaving the prods thereof in the positions shown in Fig. 14, with

the upper prod, *a*, back of the rear beveled face of the guide-dies 8 8^a, so that if the strand-wires were drawn directly forward this prod would engage with the guide-die and would be displaced. When, however, the knife-heads recede, the plate 22, disengaging the collar 59, will permit the rod 55 to spring forward, thus causing the obtuse portion 58 of its end to engage the prod *a* and to turn the barb over to the right far enough to "strip" or disengage it from the guide-die, and to permit the barb to pass freely with the strand-wires toward the reel. At the same time the wedge-shaped arm 57 will enter the space between the strand-wires, and will spread them sufficiently to permit the insertion of the succeeding barb; but as soon as this barb is fed and the knives begin to approach, the plate 22 will engage the collar 59, and the spreader and stripper rod 55 will be retracted out of the path of the barb, and far enough to allow the strand-wires to close again. The function of the spreading-wedge 57 is to assist the spreading-arms 39 and 40 in separating the strand-wires. If desired, the latter may be omitted and the wedge used alone.

Fig. 15 illustrates the spring-rod 55 provided with the stripping end 58 alone, without the spreading-wedge. It is shown in its most advanced position, having freed the prod *a* of the barb from the guide-die. The collar 59 is fitted loosely on the rod 55, and provided with a set-screw, 61, by which it may be set at any desirable position on the rod, and the throw and period of motion of the stripper and spreading-wedge varied accordingly.

I will now describe more particularly the setting and adjustment of the knives and their heads. The uprights 5, which support the heads, are two in number, and are joined by a connecting brace or plate, 5^a. (See Figs. 3 and 6.) On one side of the frame thus constituted are arranged two vertical grooved slide bearings or brasses, 26, which are set against opposite posts of the frame, and are adjustably fixed thereto by means of set-bolts 45. The lower knife-head, 4, is mounted by means of lateral tongues in these grooved bearings, so as to be movable vertically therein, and on the rear side is provided with mortised vertical recesses, within which are set the knives 6 and 6^a. The latter are made vertically adjustable in the head by means of set-bolts 46, bearing against their lower ends. The latter are shown in Figs. 2 and 3.

Referring still to Fig. 6, vertical slide-bearings 27 are set in the sides of the uprights 5 on the side of the brace 5^a opposite from the bearings 26. These are likewise grooved, and are made adjustable by bolts 47. The upper knife-head, 3, is tongued laterally, as at 27^a, Fig. 7, and is mounted in the slide-bearings 27. The knives 7 7^a are set in a mortise or recess, 48, near the top of the inner face of the head, with their cutting-edges directed downward, and between them, in the same recess,

is set the presser-foot 24. These knives and the presser-foot are held in position by a face-plate, 22, bolted to the head 3 over the recess 48. The knives 6 and 6^a are secured in a like manner to the head 4.

As shown in the drawings, the frame 5 5^a is set at right angles to the course of the strand-wires, the head 4 is mounted on its rear face and the head 3 on its front face, an enlarged portion at the top of the latter head projecting back, so that the dependent knives will lie on the rear side of the frame. The strand-wires, when barbed, pass through a hole, 28, in the frame 5 5^a, and through an elongated hole, 50, made in the sliding head 3 in opposition thereto, the movement of the knife head being not great enough to interfere with the free passage of the wires through the hole 50.

The fixed die 8 8^a is set upon a bracket, 49, on the rear side of the frame, and is held in position by a retaining plate or bush, 51, and by bolts 52, which bear thereon.

I derive a material advantage from the arrangement of the knives 6 6^a and 7 7^a in separate parts, for the reason that it facilitates their adjustment in their heads, and enables any one of them to be removed for grinding, and to be reset whenever the wear of its cutting-edge causes it to act imperfectly in severing the bars.

Thus constructed, my improved machine has proved itself to be of great utility. It works continuously without stopping of the strand-wires or any of the mechanism, and affixes the barbs with great rapidity. Each barb as it is cut off leaves a point on the end of the barb-strip, which forms the point of the succeeding barb. Waste of material is thereby prevented.

The use of the guide-die 8 8^a is of especial advantage, because it determines with accuracy the relative locations of the V-shaped cuts which form the fish-tail of the barbs, and insures the junction of these cuts and the certain severance of the barb. Without this die the cuts might not always meet, and if this should occur by reason of faulty adjustment of the knives the barb would not be disunited from the strip 30, and would catch in the strand-wires, stop their progress, and necessitate the stopping of the machine to disengage the partially-cut barb.

By inspection of the drawings it will be seen that the beveled point of the guide-die 8 8^a is symmetrical—i. e., the angles formed by its inclined sides with the sides of the die are equal. The consequence is that when the die has been used for so long a time in a given position to wear its cutting-edges (which are the upper edges of the lower section of the die) it may be turned over and the edges of the other section used as the cutting-edges. In this way I am enabled to use the die for a double period of time without regrinding.

I do not desire to limit myself to the die 8 8^a

thus constructed with a symmetrical point, although I have embodied this feature in one of the following claims.

I am aware that in Letters Patent No. 314,481, dated March 24, 1885, there has been shown and described a guide-die in some respects similar to the guide-die 8 8^a, but having its end beveled pyramidally to a point. I desire to disclaim such arrangement. It is incapable of successful operation, because the channel through the body of the die would necessarily cut the point away or weaken it, and would prevent the die from acting properly in producing the desired fish-tail at the rear end of the barb. I therefore limit the construction of my guide-die to one whose end is laterally beveled to a vertical edge. This produces a strong and durable die.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a wire-barbing machine, of mechanism for feeding a barb-strip between strand-wires, mechanism for feeding the latter, moving knives for shearing a barb-blank from the strip after it has been so introduced between the wires, and spreading pins or arms connected with and moving with the knives, said spreading pins or arms engaging the strand-wires and separating them when the knives are retracted, to permit insertion of the barb-strip, substantially as and for the purposes described.

2. The combination, in a wire-barbing machine, of mechanism for feeding a barb-strip between strand-wires, mechanism for feeding the latter, moving knives for shearing a barb-blank from the strip after it has been introduced between the wires, and spreading arms or pins connected with and actuated by the heads of the knives, so as to separate the wires during the latter part of the retracting movement of the knives, to permit the insertion of the barb-strip, substantially as and for the purposes described.

3. The combination of a guide-die having a beveled end and a groove or way through its body for passage of a barb-strip, so that it may project from the die, knives 6 and 7, having cutting-edges which move in contact with the beveled end of the die, whereby the barb is cut with a fish-tail or V on the end thereof and the end of the strip is provided with a point the counterpart of the fish-tail or V, knives 6^a 7^a, moving toward each other and against the strip, all of said knives 6, 7, 6^a, and 7^a being made separate from each other and the members of each pair separated laterally, to allow passage of the strand-wires, and mechanism for actuating the knives, substantially as and for the purposes described.

4. The combination, in a wire-barbing machine, of a die having its end laterally beveled to a vertical edge, and having a channel or

way through which a barb-strip is fed so as to project from the edge of the guide-die, and moving knives having blades which move in contact with the beveled sides of the end of the die, whereby the barb is cut with a fish-tail or V at the end thereof, and the end of the strip is provided with a point the counterpart of the fish-tail or V, substantially as and for the purposes described.

5. The combination, in a wire-barbing machine, of mechanism for feeding a barb-strip between the strand-wires, mechanism for feeding the latter, moving knives for shearing a barb-blank from the strip after it has been introduced between the wires, and for bending parts of the blank around the wires, moving presser-feet 23 and 24, arranged to engage the strand-wires during the cutting and bending operation, and to clamp them upon the interposed barb-blank, and mechanism for actuating said knives and presser-feet, substantially as and for the purposes described.

6. The combination of a guide-die having a channel or passage through its body for passage of a barb-strip, and having its end laterally and symmetrically beveled to a vertical edge, and moving knives whose blades are inclined to cut in contact with the beveled sides of the end of the die, substantially as and for the purposes described.

7. The combination, in a wire-barbing machine, of a die which acts in shearing the barbs, and a stripper arranged to move after the cutting of the barb to engage it, and to free it from the die, and mechanism for actuating the stripper, substantially as and for the purposes described.

8. The combination, in a wire-barbing machine, of a spring-actuated stripper, a die, and a moving knife for shearing the barbs, the stripper being arranged in the path of the head of the knife, so as to be retracted by the cutting motion thereof, and to be projected at the retraction of the knife, to disengage the barb from the die, substantially as and for the purposes described.

9. In a wire-barbing machine, the wedge arranged so as to be capable of projection between the strand-wires for spreading the same, and mechanism for projecting and retracting the wedge, substantially as and for the purposes described.

10. In a wire-barbing machine, the pivoted lever 43, bearing upon the strand-wires, and movable to separate them, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 29th day of August, A. D. 1885.

JOHN STUBBE.

Witnesses:

THOMAS W. BAKEWELL,
JAMES H. PORTE.