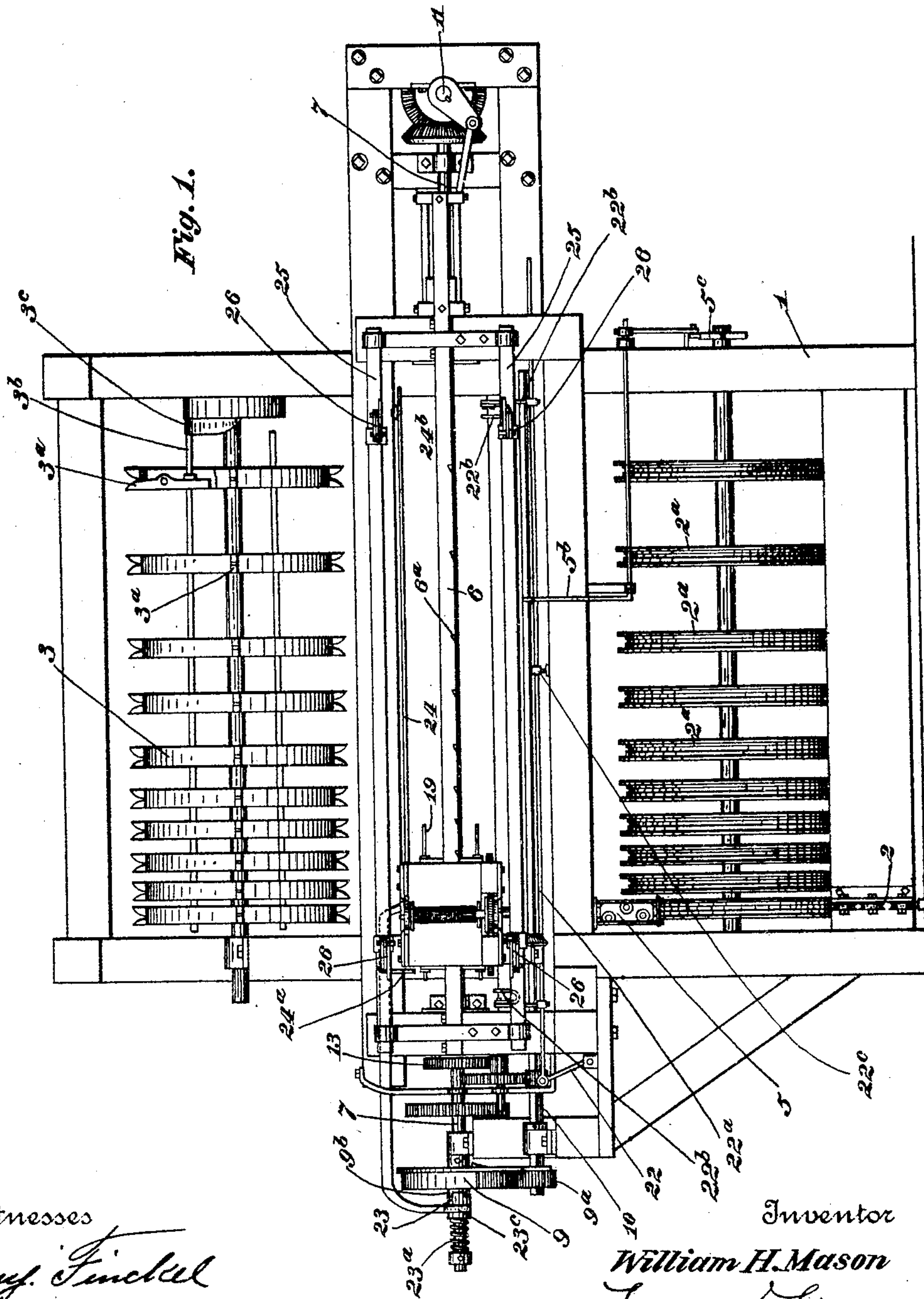


No. 803,613.

PATENTED NOV. 7, 1905.

W. H. MASON.
WIRE WEAVING MACHINE.
APPLICATION FILED NOV. 9, 1904.

5 SHEETS—SHEET 1.



Witnesses

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Chas. W. Eckstein

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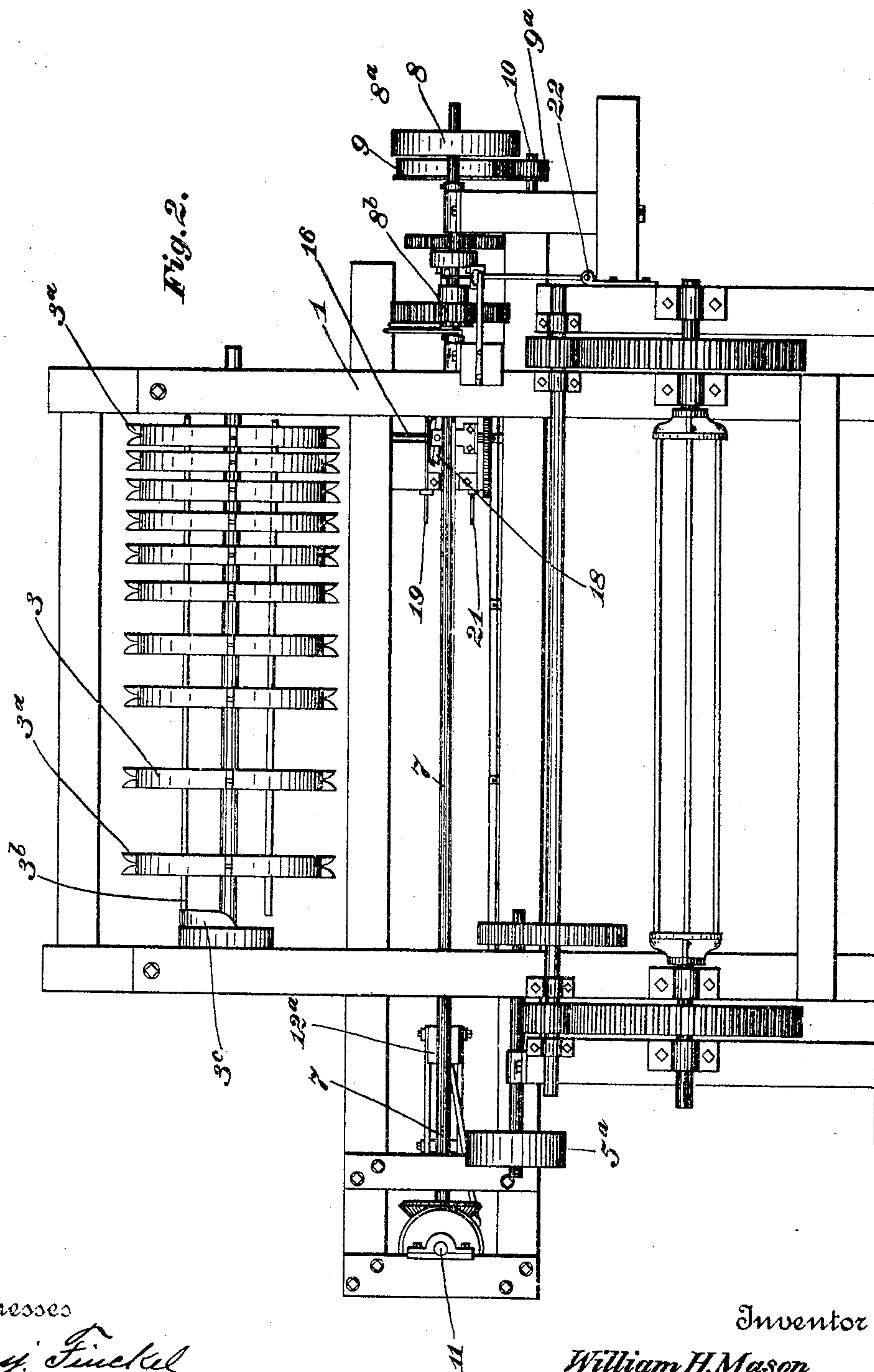
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5 SHEETS--SHEET 2.



Witnesses

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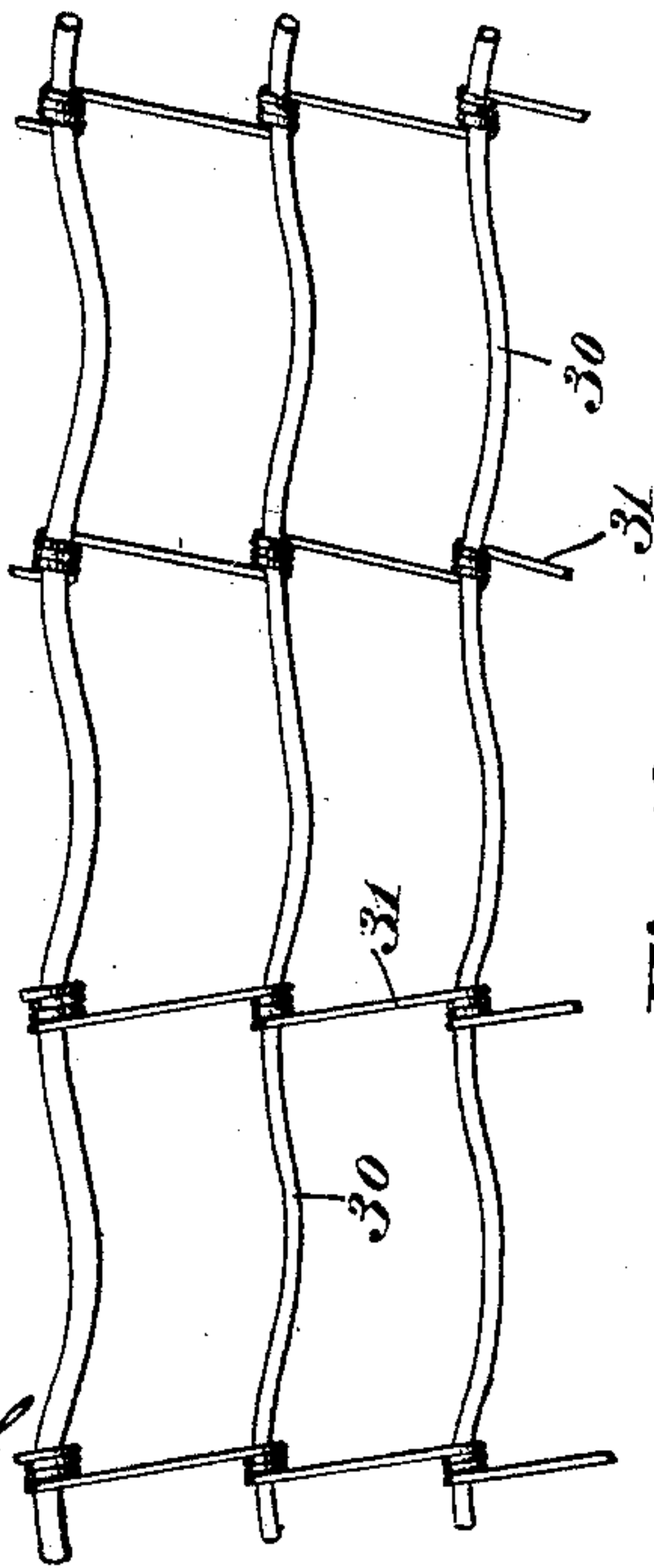
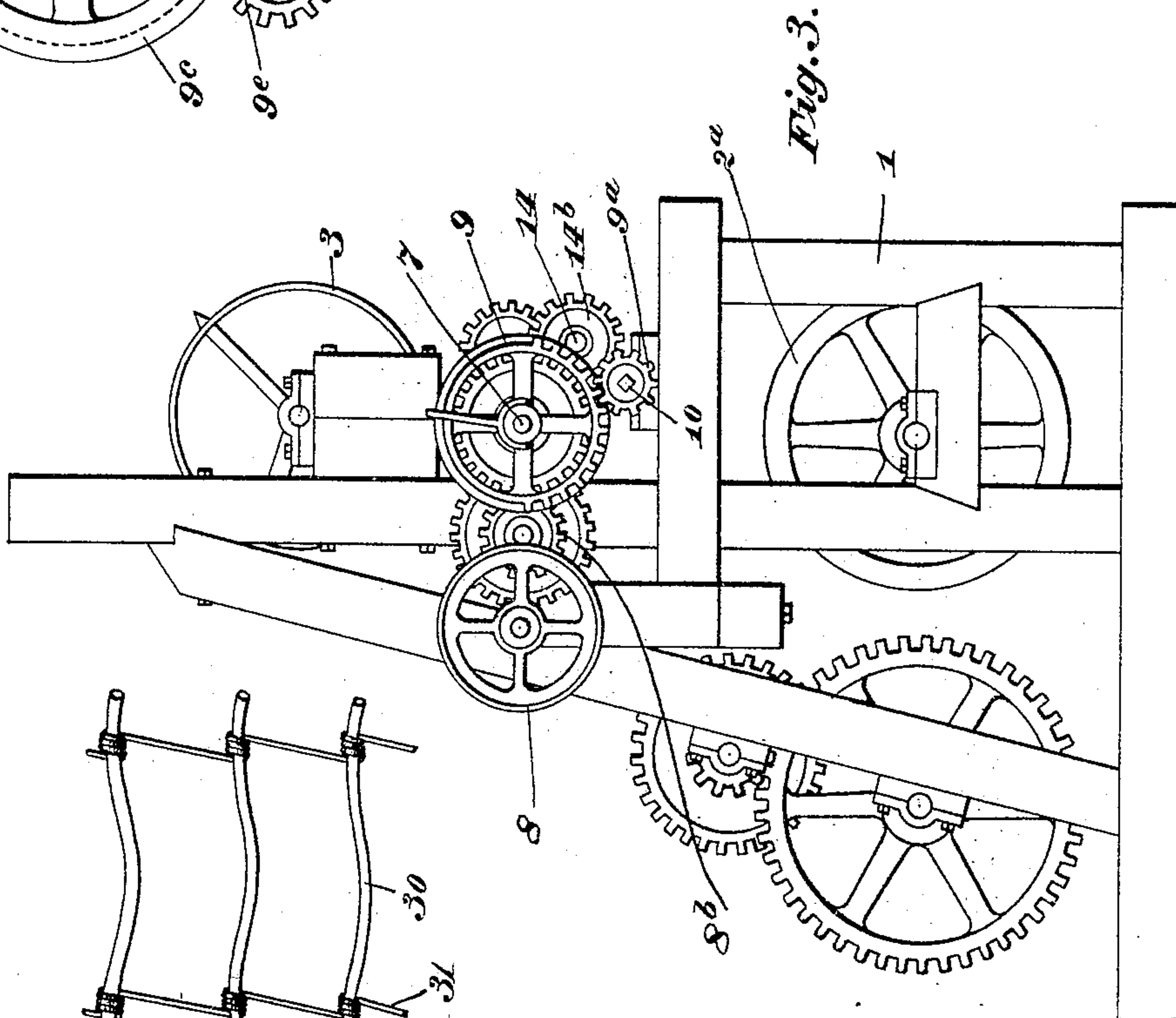
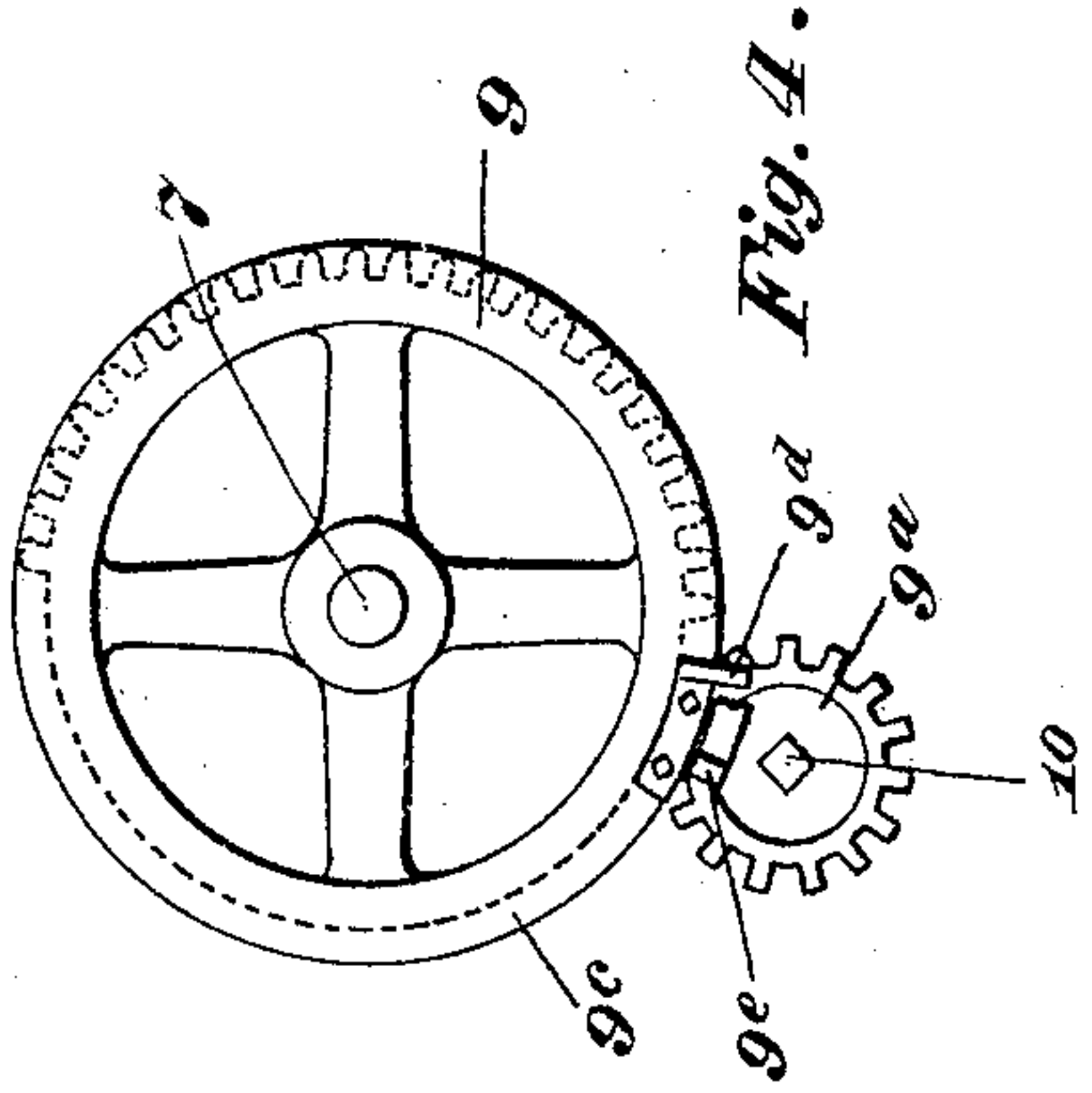
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5 SHEETS—SHEET 3.



Witnesses

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5 SHEETS—SHEET 4.

Fig. 6.

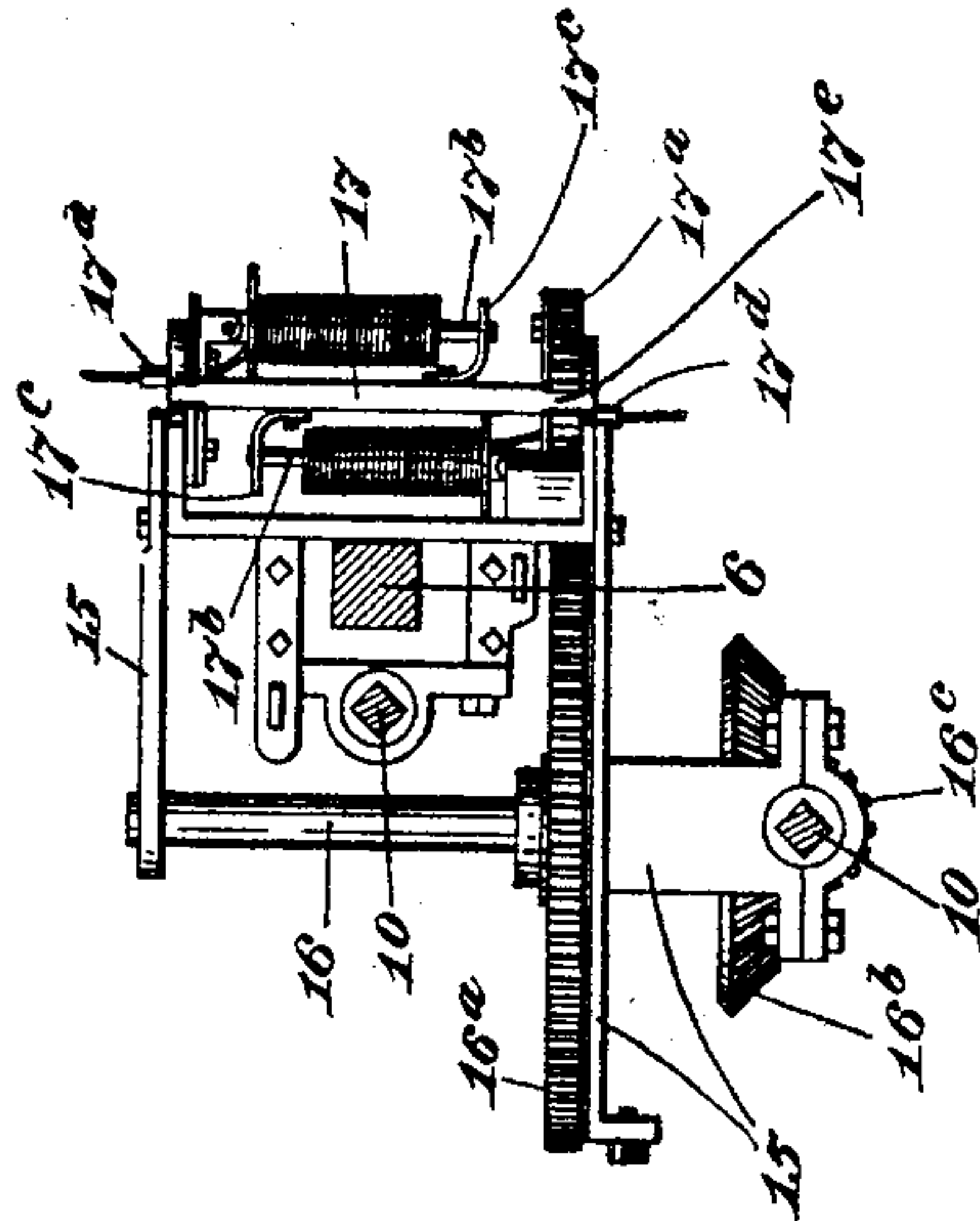


Fig. 7.

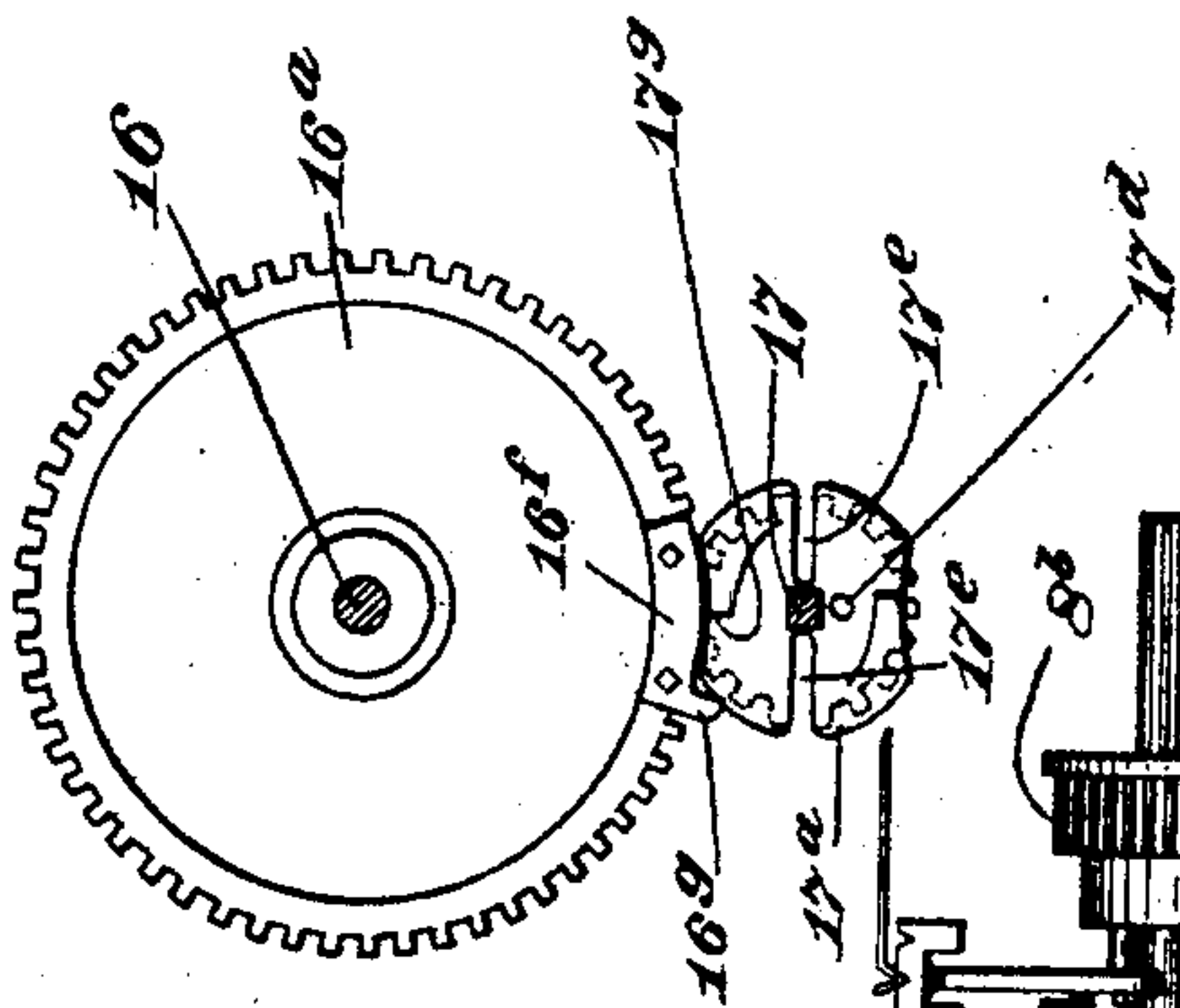
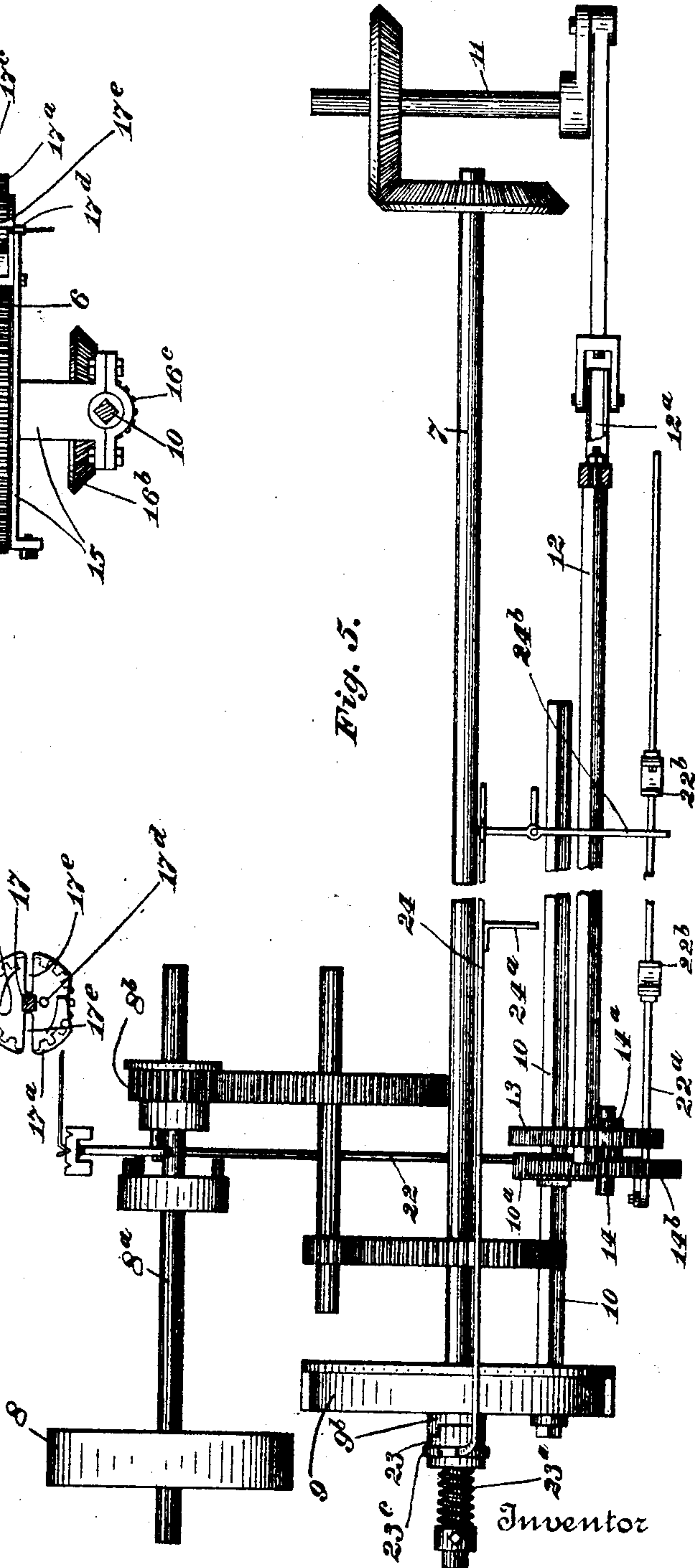


Fig. 5.



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5 SHEETS—SHEET 5.

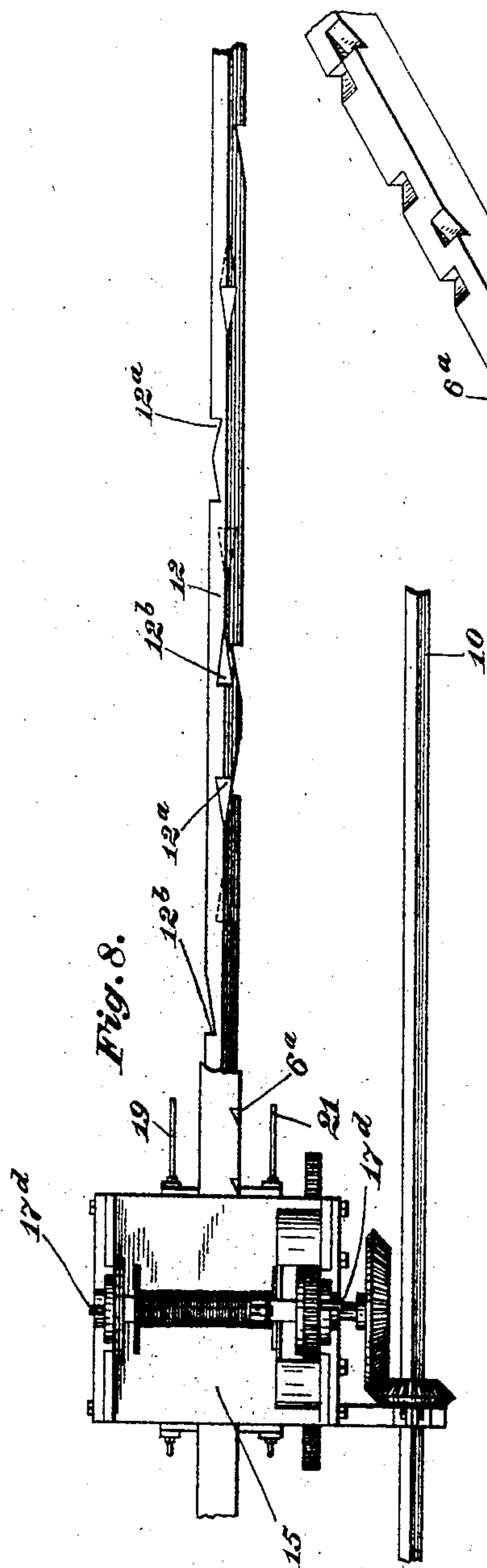


Fig. 8.

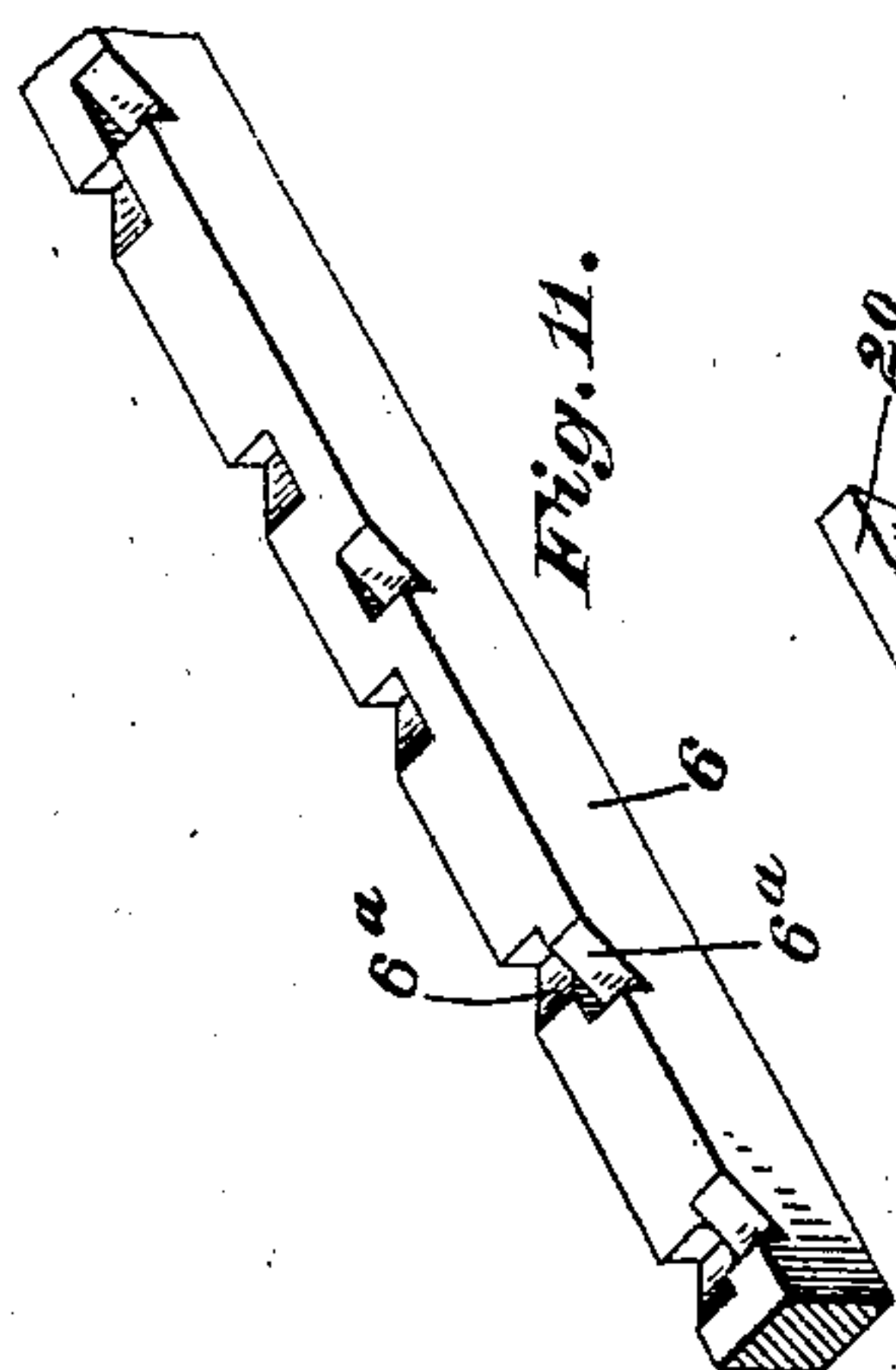


Fig. 11.



Fig. 12.

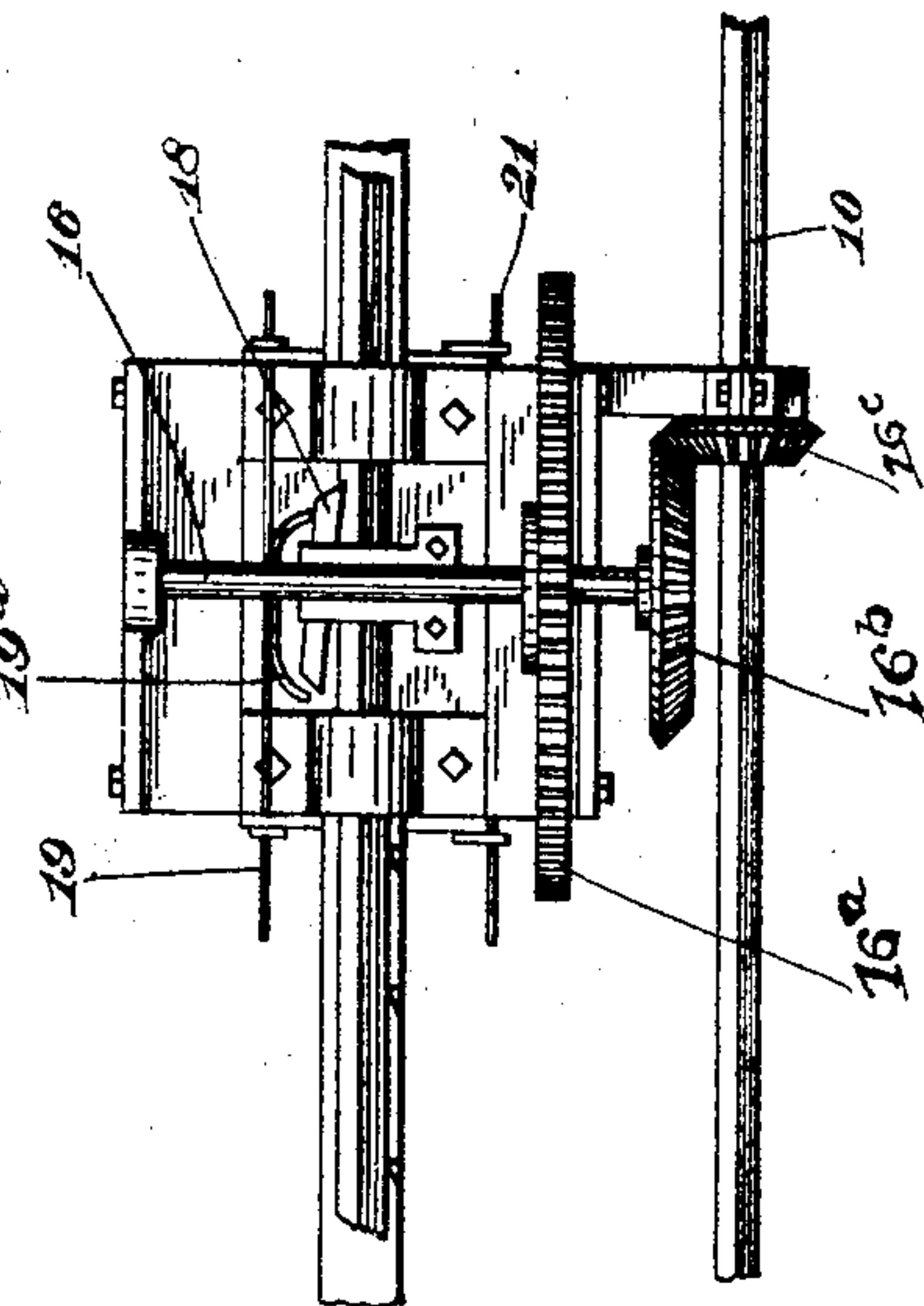


Fig. 9.

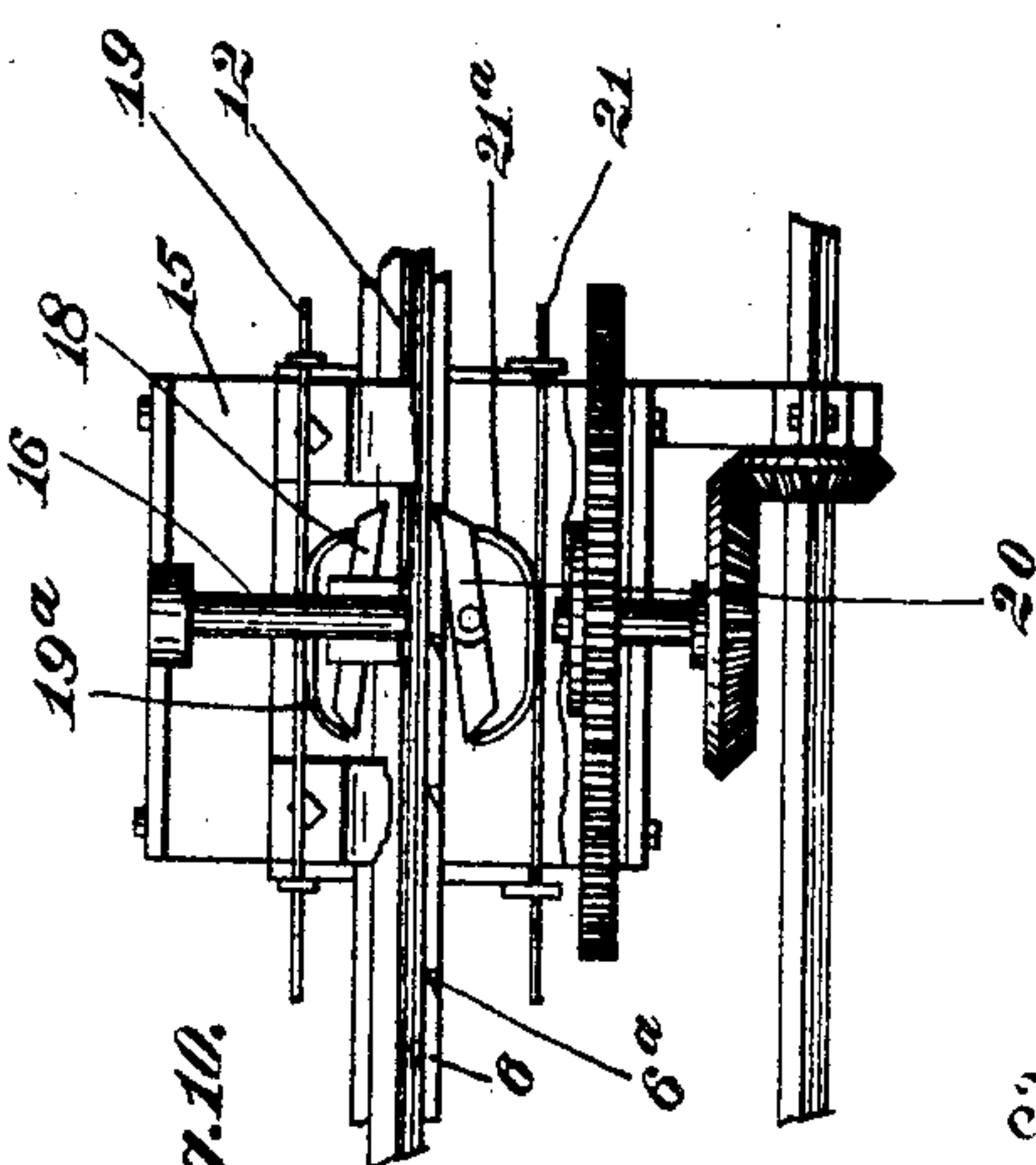


Fig. 10.

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UNITED STATES PATENT OFFICE.

WILLIAM HENRY MASON, OF LEESBURG, OHIO.

WIRE-WEAVING MACHINE.

No. 803,613.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed November 9, 1904. Serial No. 232,022.

To all whom it may concern:

Be it known that I, WILLIAM HENRY MASON, a citizen of the United States, residing at Leesburg, in the county of Highland and State of Ohio, have invented certain new and useful Improvements in Wire-Weaving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The machine shown herein is designed more particularly for the manufacture of wire fencing, which when in place in the field presents a series of horizontal strand-wires crossed and connected by vertical stay-wires twisted about the strand-wires. The machine, however, is provided with means for giving a distended cork-screw coil to the strand-wires to allow for contraction and expansion due to variation in temperature and to give the fence horizontal elasticity laterally to prevent injury by cattle. In the manufacture of fencing with the present machine the strand-wires pass vertically through the machine shown, and the device for putting on the stay-wires, which for brevity I shall call the "shuttle," traverses horizontally the plane of the strand-wires. Further, the machine shown is adapted to twist stay-wires onto a series of strand-wires that are spaced from left to right with progressively-widening spaces, the fence being erected with the more closely spaced portion at the bottom to prevent the passage of small animals. The invention, however, is not limited to a machine for producing the peculiar fabric herein referred to, as the machine can be adapted by changes within the province of ordinary mechanical skill to make fabric in which the running wires are evenly or irregularly spaced, and the fabric obviously can be used for purposes other than fencing.

Generally stated, the invention comprises principally a shuttle, a reciprocated rod adapted to move the bobbin-carriage with a step-by-step motion, means for operating the shuttle to twist or put on the cross or stay wires during the intervals of the said step-by-step motion, and means in connection with the aforesaid devices for reversing the direction of the movement of the shuttle.

The invention also comprises details which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, showing one embodiment only of the invention, Figure

1 is a general view in elevation of the front of the machine, parts at the rear side of the machine being omitted to avoid confusion and a small portion of one of the fabric-carrying wheels at the top being in section. Fig. 2 is a general view in elevation of the rear of the machine, parts at the front side of the machine being omitted to avoid confusion. Fig. 3 is an elevation of the left-hand end of the machine. Fig. 4 is a view of the right-hand side of the sector-gear on the left-hand end of the main operating-shaft and the pinion it operates. Fig. 5 is a diagrammatic plan illustrating the main operative mechanism. Fig. 6 is a detail side view of the twister looking at it from the left, as shown in Fig. 1. Fig. 7 is a plan of the gears for directly rotating the bobbins or wire coils. Fig. 8 is a detail front view of the twister and the rods on which it is supported and by which it is moved, held, and operated. Fig. 9 is a rear view of the same. Fig. 10 is a detail to illustrate the under dog or pawl. Fig. 11 is a perspective view of the lower side of a fraction of the stationary latch-bar on which the shuttle is supported and travels. Fig. 12 is a perspective view of the upper side of a double pawl carried by the shuttle to cooperate with the stationary bar referred to in the description of Fig. 11. Fig. 13 depicts a fraction of the product of the machine.

The structure shown comprises an appropriate supporting-frame 1, in the lower portion of which are suitable tension devices 2 and wheels 2^a and in the upper portion of which are wheels 3, having their rims provided at proper intervals with clamping-jaws, one in each pair of which is stationary and the other, 3^a, is a lever engaged by a rod 3^b, acted on by a stationary semicircular cam 3^c. The clamping-jaws grip the strand-wires in their progress upward when they are tangent to the wheels 3 at the jaws and release the said wires when they are tangential at the jaws going downward toward the reel at the rear side of the machine. The strand-wires can conveniently be brought up from a room below the floor on which the machine is supported, the floor being provided with holes for that purpose.

5 designates generally the device for giving a distended corkscrew-coil to the strand-wires. There will be one of these coilers for each of the strand-wires. The fabric as fast as it is manufactured is moved over the wheels 3 and rolled upon the reel, the rolling-up op-

eration being effected between the operations of applying the stay-wires. This rolling-up operation is independent of the operation of applying the stay-wires, and the mechanism for doing this is of an ordinary kind and does not constitute a part of my invention, except as to the special clamping devices and except in so far as such mechanism might either impliedly or expressly constitute an element co-operating in combination with novel features of the machine. The mechanism for winding up the fabric therefore need not be described in detail. It will suffice to state that the power for the winding-up operation is applied by means of a belt on the band-wheel 5^a and transmitted thence through a suitable chain of gearing to the reel. The means for effecting the transmission of the power through the train of gearing with the reel can be a suitable clutch operated by a lever 5^b, moved in one direction, located at the front of the machine and within convenient reach of the operator. The winding-up operation can be limited automatically by means of a star cam-wheel 5^c, located on the end of the shaft containing the wheels 2^a, said cam-wheel being adapted to move the lever 5^b in a reverse direction and disconnect the clutch. Where the stay-wires are to be equally spaced, and usually they will be, the times of the winding operation will be equal to each other and sufficient to effect a winding equal to the distance between the companion stay-wires applied by the shuttle.

The stay-wire applying and twisting device, which, as before stated, I shall call the "shuttle," is adapted in the instances shown to put on two stay-wires in each of its passages across the machine. The shuttle, as a whole, is supported to slide on a horizontally-arranged stationary bar 6, having its lower side provided with two parallel rows of notches 6^a, each having one square shoulder, the shoulders of one row facing in a direction opposite that of the other.

Referring now chiefly to Fig. 5, 7 designates the main operating-shaft that is supported horizontally across the machine. This shaft is driven intermittently by means of power applied to a belt-wheel 8 on a shaft 8^a, having a loose pinion 8^b and appropriate clutching mechanism, a train of gearing being provided to transmit the power to the main shaft. The main shaft 7 has at its left-hand end a normally loose segmental or mutilated gear 9, that intermittently rotates, through a pinion 9^a, a rod 10, that is square in cross-section. The gear 9 is provided with clutch-engaging teeth 9^b. At its right-hand end the shaft 7 is provided with a miter-gear meshing with a like gear on a crank-shaft 11, standing at right angles to the shaft 7, said crank-shaft having attached to its crank-arm a rod 12, also square in cross-section. The rod 12 is swiveled at its right-hand end to a

cross-head 12^a, so as to be capable of being rotated. The left-hand end of the rod 12 reciprocates through a spur-gear 13, and said spur-gear is engaged by a pinion 14^a on a short shaft 14, which shaft also contains a spur-gear 14^b, driven by a spur-gear 10^a on the square rod 10. The gears 10^a, 14^b, 14^a, and 13 are so proportioned that the rotation of the bar 10 necessary to produce a single complete twisting operation, as hereinafter described, will effect a quarter-rotation of the bar 12.

The bar 12 is made with two series of notches 12^a and 12^b, respectively, formed in the four corners of the bar, and each series is in spiral arrangement around the bar. The notches of one series have square shoulders facing in one direction and the notches of the other series have similar shoulders facing in the opposite direction. The notches 12^a of one series are adapted to engage the shuttle, as hereinafter described, to push it to the left with an intermittent motion across the machine and the notches 12^b of the other series are adapted to draw the shuttle back with a similar motion in the opposite direction.

The shuttle comprises a frame 15, which, as before indicated, is supported to slide on the stationary bar 6. Supported vertically in the frame behind the bar 6 is a shaft 16, having secured thereon a little below its middle a large spur-gear 16^a, and at its lower end a bevel-gear 16^b, engaged by a bevel-pinion 16^c on the square rod 10. Supported to turn in arc-shaped grooves in flanges on the outer side of the shuttle-frame is the stay-wire carrier and twister. This twister has a central bar 17, attached to the lower end of which is a pinion 17^a, engaged by the large mutilated gear 16^a. Hinged directly at one of their ends to the twister-frame and at opposite ends of the twister-frame are two spindles or pins 17^b, adapted to have their free ends directly caught and held in yielding spring-latches 17^c. By pressing the spring-latch off the end of the spindle the latter can be swung outward to receive a bobbin or cylinder of coiled wire, after which the pin can be relatched by pressing its free end inward onto the spring. Each of the twister-heads is provided with an eccentrically-located outlet 17^d, through which a free end of the bobbin or stay-wire is threaded. The twister-heads are also provided with opposite radial slots 17^e to permit the twister to be engaged with and disengaged from the strand-wires as the shuttle progresses from wire to wire across the machine.

With the mechanism shown the stay-wire twister will make three turns of the stay-wire about the strand-wire and then stop and pass to the next wire. To lock the twister in proper position to permit it to pass off one strand-wire onto the next, the large gear 16^a is shown in Fig. 7 to be provided at its upper

side with a small plate 16^f, having an arc-shaped edge concentric with the axis of the gear, said edge fitting in and engaging a correspondingly-shaped recess in the upper side of the pinion 17^a. This construction when so engaged will permit the large gear to be revolved, but will lock the small pinion 17^a, and therefore the twister, from revolving. To insure the proper engagement of the teeth of the gear 16^a and the pinion 17^a when the latter is to be operated by the former, the gear is provided with a lug 16^g and the pinion with a shoulder 17^g, the latter to be struck by the former when the gear is revolved.

The shuttle is provided with a double-pointed dog or pawl 18, pivoted at its middle above the notched reciprocating bar 12, so as to have one end thereof depressible to be engaged by the notches of said bar 12, and secured to a bar 19, sliding above the ratchet 18, is a double-ended spring 19^a, adapted to depress one end or the other of the pawl, according to the position of the bar 19, into position to be engaged by the notches of the bar 12. The ends of the bar 19 project beyond the shuttle-frame, so that when the frame reaches the end of its movement across the machine said bar will contact with a proper stationary part and be shifted horizontally sufficiently to shift the spring to depress and yieldingly hold the opposite end of the pawl. The shuttle is also provided with a second double-pointed dog or pawl 20 to engage the notches at the under side of the stationary bar 6 and a sliding-bar 21, that carries a double-ended spring 21^a, all to operate in substantially the same way as the pawl 18, bar 19, and spring 19^a, except that the function of the dog 20 is simply to lock against the strain of the strand-wires the shuttle in the position to which it is moved on the stationary bar 6 by the reciprocating bar 12.

The clutch for effecting the connection and disconnection of the power from the shaft 8^a is operated by the rear arm of a bell-crank lever 22, the front arm of which has attached thereto a rod 22^a, extending horizontally along the front of the machine and provided with elastic stop-arms 22^b, located to be struck by the shuttle after it has twisted the stay-wires around the last of the strand-wires. The rod 22^a is furnished with a hand-lever 22^c, by means of which the power of the shaft 8^a can be transmitted to the loose pinion 8^b.

The left-hand end of the main operating-shaft 7 is provided with sliding clutch 23, rotating with the shaft and pressed by a spring 23^a toward the loose gear 9 to lock said gear with said shaft 7. The means for disengaging this clutch from the gear 9 consists of a rod 24, extending across the front of the machine and having its left-hand end attached to a loose collar 23^c, engaging an annular groove in the clutch 23 and provided with an

outwardly-projecting finger 24^a and a lever 24^b, arranged and adapted to be struck and pressed by the shuttle at the end of its movement across the machine to disconnect the clutch 23. The finger 24^a and lever 24^b are located to be struck by the shuttle slightly before the stop-arms 22^b are struck. Hence the clutch 23 is disconnected from the gear 9 at a time slightly preceding the disconnection of the power from the shaft 7, and reversely the connection of the power with the shaft 7 precedes the connection of the clutch 23 with the gear 9; but the time of the connection of the clutch 23 with the gear 9 is further enlarged by the fact that the clutch is slightly turned by the initial rotation of the shaft 7, so that by the time the clutch is fully released the ends of the clutch-teeth 23 rest on the ends of the clutch-teeth of the hub of the gear 9 and slide on each other until a half-revolution of the shaft 7 is made. During this half-revolution of the shaft 7 the notched square bar 12 makes one stroke through the gear 13 without being turned; but the return stroke moves the shuttle—that is to say, after the shuttle has finished twisting the stay-wires about the extreme right or left strand-wires, according to the direction in which the shuttle may be traveling, one stroke of the square bar 12 carries the shuttle out clear of the fabric, at which time the power is automatically cut off, and this part of the machine remains inactive until the section of the fencing just completed has been advanced. The bar 12 in its forward and backward movements at this point carries the shuttle in each of its movements, or, in other words, one movement of bar 12 clears the shuttle from the fabric and the return movement of the bar returns it ready for the twisting operation; but between the time that the shuttle is carried clear of the fabric and the time it is returned the fabric is advanced, the bar 12 makes the complete back-and-forth stroke through the gear-wheel 13 without being rotated.

In order to lock the bar 10 from rotation during the movement of the shuttle by the bar 12 and to properly and certainly effect the engagement of the teeth of the gear 9 with the teeth of the pinion 9^a, a construction like that indicated in Fig. 4, which is somewhat like that shown in Fig. 7, is employed—that is to say, the gear 9 has a smooth curved convex edge or rim 9^c, that enters a small correspondingly-curved concave edge on the pinion and prevents the pinion from rotation unless and until the teeth of the gear enmesh with those of the pinion, a projection 9^d on the gear 9 being provided to strike a lug 9^e on the pinion to start the pinion and properly enmesh the teeth of the gear therewith to rotate the bar 10. It will be observed from this construction that continuous rotation of the shaft 7 will produce an intermittent rota-

tion of the bar 10; but in this connection it will be remembered that the rotation of the shaft 7 in the construction shown is itself automatically controlled as to stopping.

25 25 designates stationary bars or rails secured horizontally on the front of the machine slightly above and below the path of the shuttle, on which are hand-operated clamps 26 of any suitable construction for gripping and
10 holding securely the ends of the stay-wires, and therefore that portion of the fabric being made, while the shuttle is proceeding in its work from one side of the machine to the other.

15 In Fig. 13 the character 30 designates the strand-wires and 31 the stay-wires, the strand-wires being shown in the horizontal position, which they occupy when the fabric is used as fencing, and not as they appear when passing
20 through the machine. It will be observed that the coils of the two pairs of strand-wires are reversely wound. This of course is due to the fact that the shuttle is moved in opposite directions across the machine, while the
25 twistors are turned in the same direction.

The operation is as follows: Assuming that the strand-wires have been properly passed up through the tension devices 2, around the wheels 2^a, across the plane of operation of
30 the twistors, around the wheels 3, and attached to the reel and the shuttle provided with bobbins or cylinders of stay-wire and in position at the left-hand side of the machine, the operator secures the ends of the wires of the
35 bobbins in the clamps 26 and moves the hand-lever 22^c to start the operation. The shuttle is first carried to the first strand-wire, where the stay-wires are twisted on. The twister is then automatically locked in the position per-
40 mitting it to pass off the strand-wire and the shuttle drawn by the reciprocating bar 12 to the next strand-wire, where the twisting operation is repeated in the same way. The shuttle proceeds thus across the machine from
45 strand to strand until the last strand is wrapped by the stay-wires, the shuttle being moved beyond the last strand-wire and clear of the fabric, when the power is automatically cut off by the contact of the shuttle with the stop
50 22^b. The stay-wires are then cut by the operator with a pair of nippers and the whole fabric moved upward by moving with the hand the lever 5^b. The operator then clamps the free ends of the bobbin or stay wires in
55 the clamps 26 at the right-hand side of the machine and by moving the hand-lever 22^c the movement of the shuttle to the first strand-wire and from strand-wire to strand-wire with the stay-twisting operations proceeds sub-
60 stantially as before.

Changes in the forms of parts can be made without departing from the scope of the invention. As an instance of this it may be
65 stated that the shuttle-moving bar 12 and the twister-operating bar 10 are not necessarily

square in cross-section. Other changes will readily occur to those skilled in the art.

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

1. In a wire-weaving machine, the combination with strand-wire carriers, a shuttle carrying a bobbin-wire twister and operating devices therefor, a notched bar for moving the shuttle from strand-wire to strand-wire, means for reciprocating said bar, and mechanism for automatically operating the twisting devices to twist the bobbin-wire about the strand-wire. 70 75

2. In a wire-weaving machine, the combination with strand-wire carriers, a shuttle carrying a bobbin-wire twister and operating devices therefor, a notched bar for moving the shuttle from strand-wire to strand-wire, means for reciprocating and turning said bar, and mechanism for automatically operating the twisting devices to twist the bobbin-wire about the strand-wires. 80 85

3. In a wire-weaving machine, the combination with strand-wire carriers, a shuttle carrying a bobbin-wire twister and operating devices therefor, a bar angular in cross-section having its edges provided with pawl-engaging notches, means for reciprocating and rotating said bar, and a pawl on the shuttle to be engaged by said bar. 90 95

4. In a wire-weaving machine, the combination with strand-wire carriers, a shuttle carrying a bobbin-wire twister and operating devices therefor, a bar angular in cross-section having its edges provided with two reversely-acting series of pawl-engaging notches spirally disposed on said edges, means for reciprocating and rotating said bar, a double pawl on the shuttle to be engaged by said bar, and means for automatically moving the proper end of said pawl into position to be engaged by one of the series of notches on said bar when the shuttle arrives at the end of its movement across the machine. 100 105

5. In mechanism for moving a wire-shuttle, a bar having a spirally-disposed series of shuttle-engaging notches, and means for both reciprocating and rotating said bar. 110

6. In mechanism for moving a wire-shuttle, a bar having two spirally-disposed series of reversely-acting shuttle-engaging notches, and means for both reciprocating and rotating said bar. 115

7. In mechanism for moving a wire-shuttle, a reciprocated bar to move the shuttle with a step-by-step motion having a spirally-disposed series of shuttle-engaging notches, and means for rotating said bar when not moving the shuttle and holding said bar from rotation when moving the shuttle. 120 125

8. In mechanism for moving a wire-shuttle, a reciprocated bar to move the shuttle with a step-by-step motion having two spirally-disposed series of reversely-acting shuttle-engaging notches, and means for rotating said bar 130

when not moving the shuttle and holding said bar from rotation when moving the shuttle.

9. In mechanism for moving a wire-shuttle and operating wire-twisting devices therein, a reciprocated bar to move the shuttle with a step-by-step motion having two spirally-disposed series of reversely-acting shuttle-engaging notches, means for rotating said bar when not moving the shuttle and holding said bar from rotation when moving the shuttle, and means for operating the twisting devices of the shuttle in the intervals of the step-by-step motion of the shuttle.

10. In mechanism for moving a wire-shuttle and operating wire-twisting devices therein, a reciprocated bar to move the shuttle with a step-by-step motion having two spirally-disposed series of reversely-acting shuttle-engaging notches, means for rotating said bar when not moving the shuttle and for holding said bar from rotation when moving the shuttle, means for operating the twisting devices of the shuttle in the intervals of its step-by-step motion, and means for latching the shuttle-frame from reverse movement at the end of each of its step-by-step movements.

11. In mechanism for moving a wire-shuttle and operating a wire-twisting device therein, a reciprocated bar to move the shuttle with a step-by-step motion having two spirally-disposed series of reversely-acting shuttle-engaging notches, means for rotating said bar when not moving the shuttle and for holding said bar from rotation when moving the shuttle, means for operating the twisting devices of the shuttle in the intervals of its step-by-step movements, and means for locking the twisting device during the step-by-step movements of the shuttle.

12. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating and rotating bar for moving the shuttle with a step-by-step motion, and a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, and a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the rotation of both bars.

13. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating and rotating bar for moving the shuttle with a step-by-step motion, and a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, and a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the intermittent rotation of both bars.

14. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating bar for moving the shuttle with a step-by-step

motion, and a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the rotation of both bars, a power-shaft, gearing between the power-shaft and the aforesaid main shaft, clutching devices for connecting and disconnecting the power-shaft and the aforesaid main operating-shaft, and means operative by the shuttle for automatically operating said clutches.

15. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating rod for moving the shuttle with a step-by-step motion, a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the rotation of both bars, a power-shaft, gearing between the power-shaft and the aforesaid main shaft, clutching devices operative to connect and disconnect the power-shaft and the aforesaid main operating-shaft, and a clutching device operative to connect and disconnect the means for rotating the said rods.

16. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating rod for moving the shuttle with a step-by-step motion, a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the rotation of both bars, a power-shaft, gearing between the power-shaft and the aforesaid main shaft, a clutching device operative by the shuttle for disconnecting the power-shaft and the aforesaid main operating-shaft, and a clutching device for connecting the means for rotating the said rods operative by the shuttle.

17. In a wire-weaving machine, the combination of a shuttle carrying a bobbin-wire-twisting device, a notched reciprocating rod for moving the shuttle with a step-by-step motion, a rotary bar with respect to which the shuttle moves for operating the twisting mechanism therein, gearing between said bars, a main operating-shaft with gearing connected therewith for effecting the reciprocation of the notched bar and the rotation of both bars, a power-shaft, gearing between the power-shaft and the aforesaid main shaft, clutching devices operative by the shuttle for disconnecting the power-shaft and the aforesaid main operating-shaft, and a clutching device for connecting the means for rotating the said rods also operative by the shuttle, said clutching device being adapted to permit

a stroke of the shuttle-moving rod without the same being turned prior to the operation of the devices for rotating said rod.

18. In a wire-weaving machine, the combination with a bobbin-wire-twister frame, of a straight one-part spindle to receive the bobbin-wire hinged directly at one end to the twister-frame, and a yielding spring-latch also on the twister-frame adapted to engage

and hold the other free movable end of said spindle, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HENRY MASON.

Witnesses:

C. M. OVERMAN,

W. F. TERWILLIGER.