(No Model.) 3 Sheets—Sheet 1.

T. M. CONNER.

NETTED WIRE FABRIC MACHINE.

No. 459,926. Patented Sept. 22, 1891.

Fig. 1

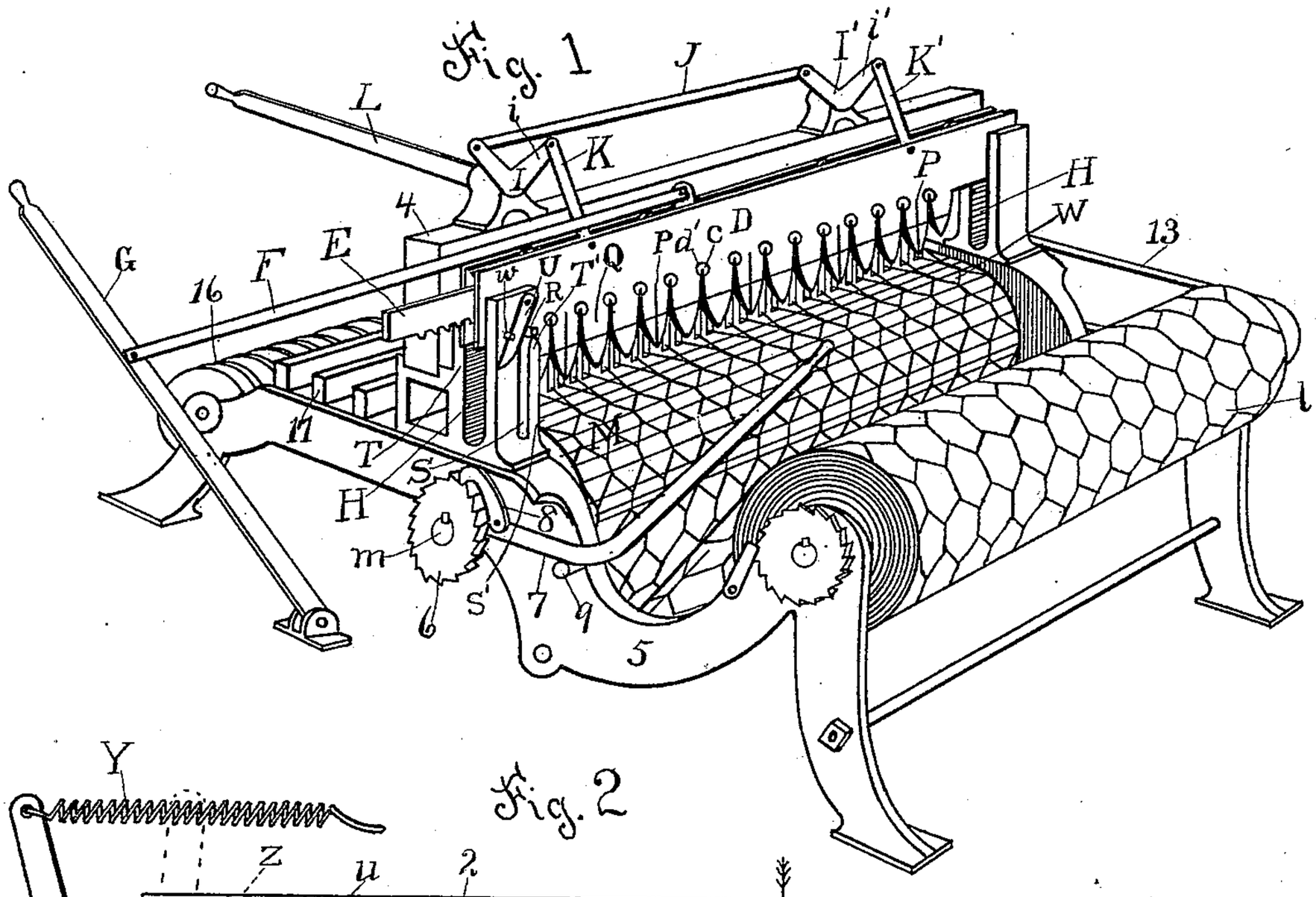
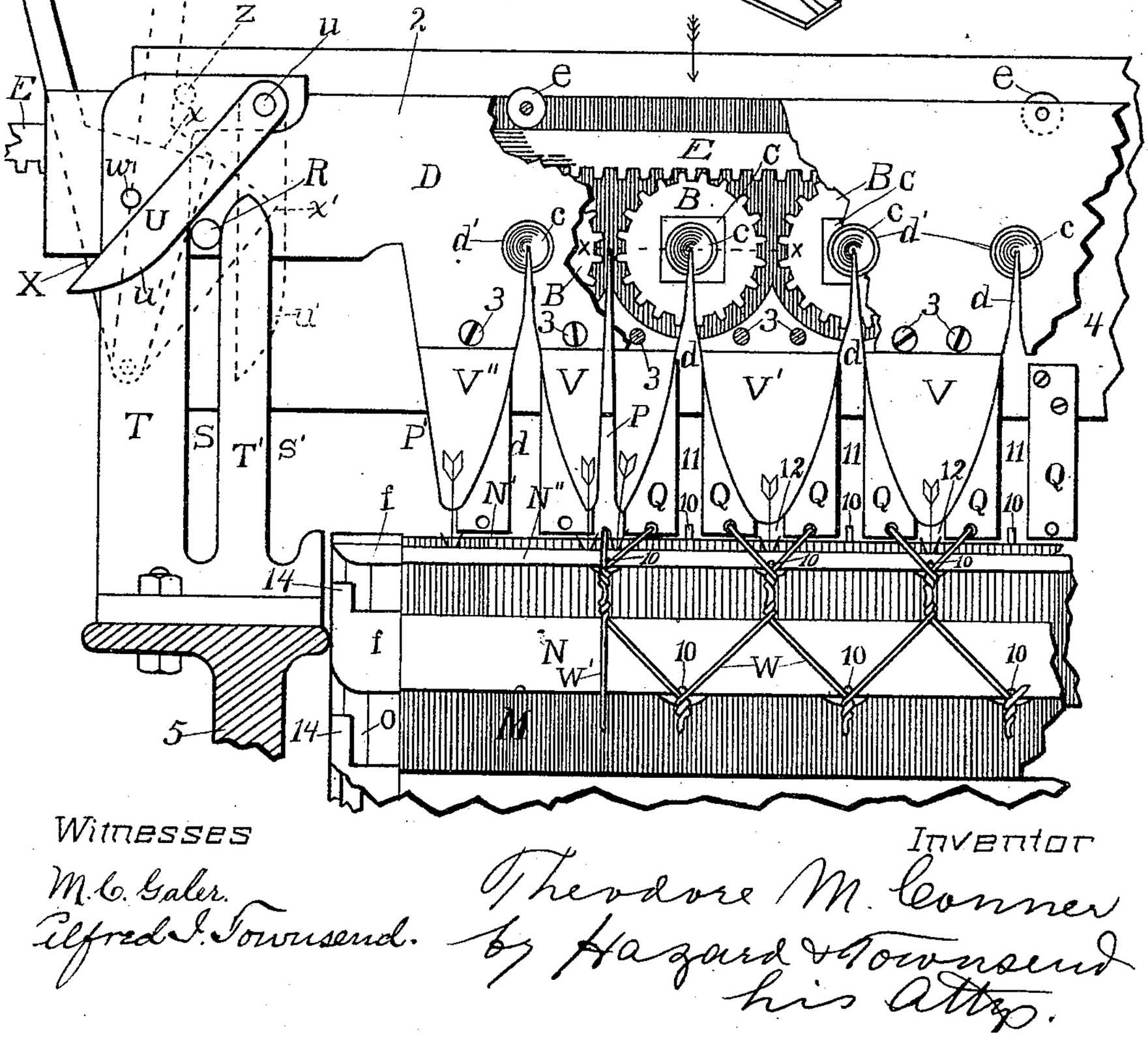


Fig. 2



Witnesses

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3

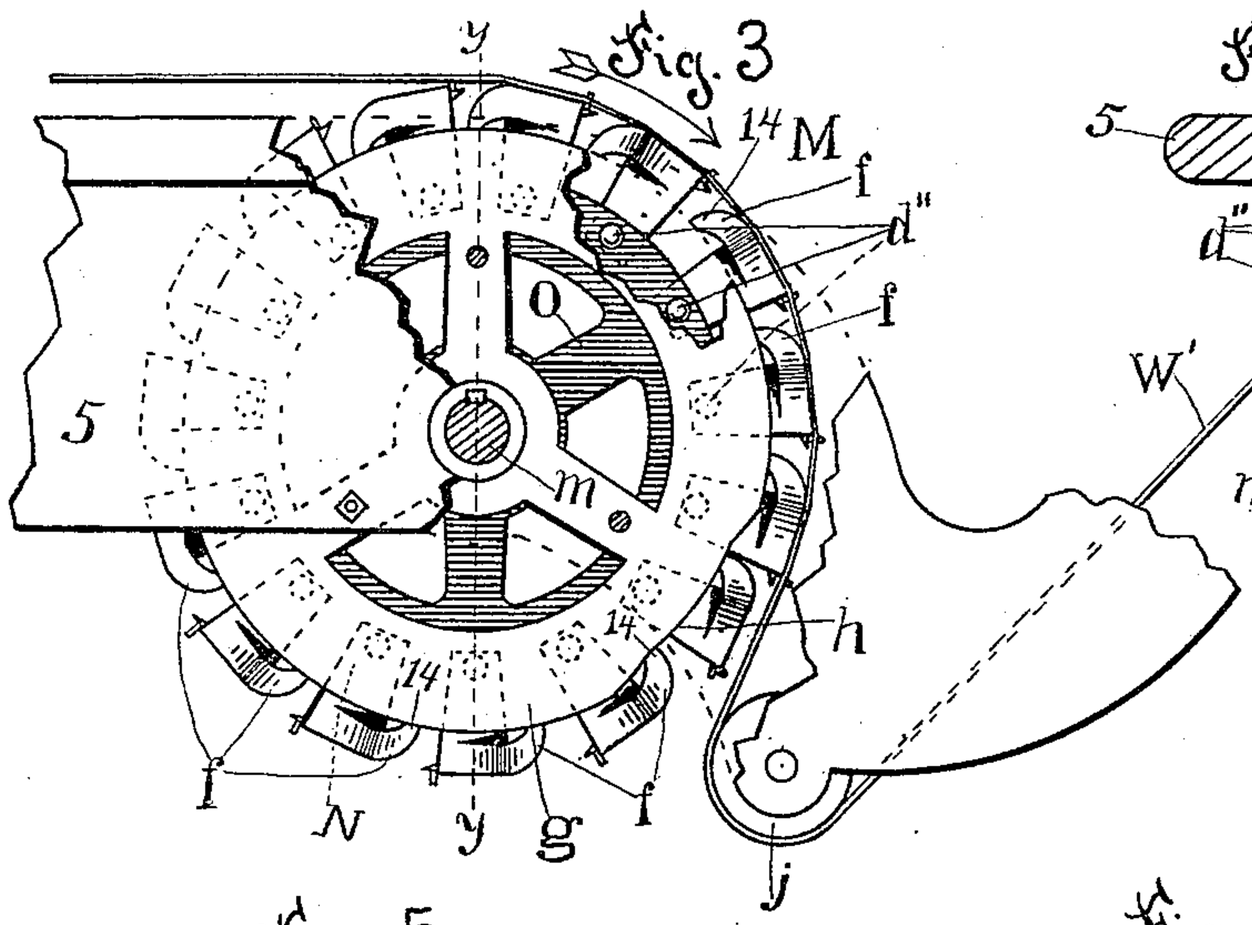

Fig. 4

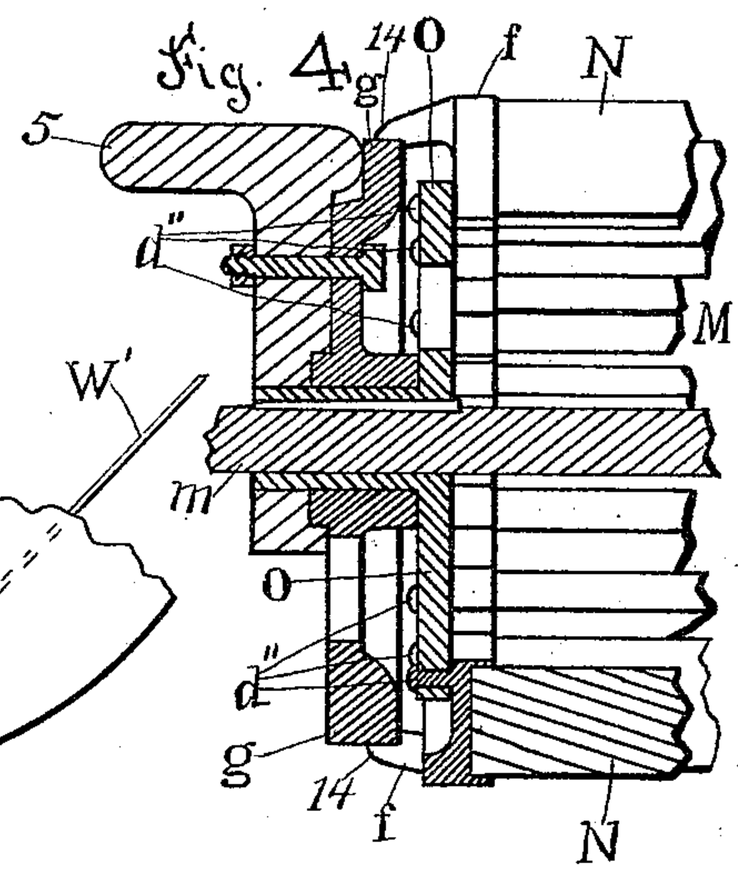

Fig. 5

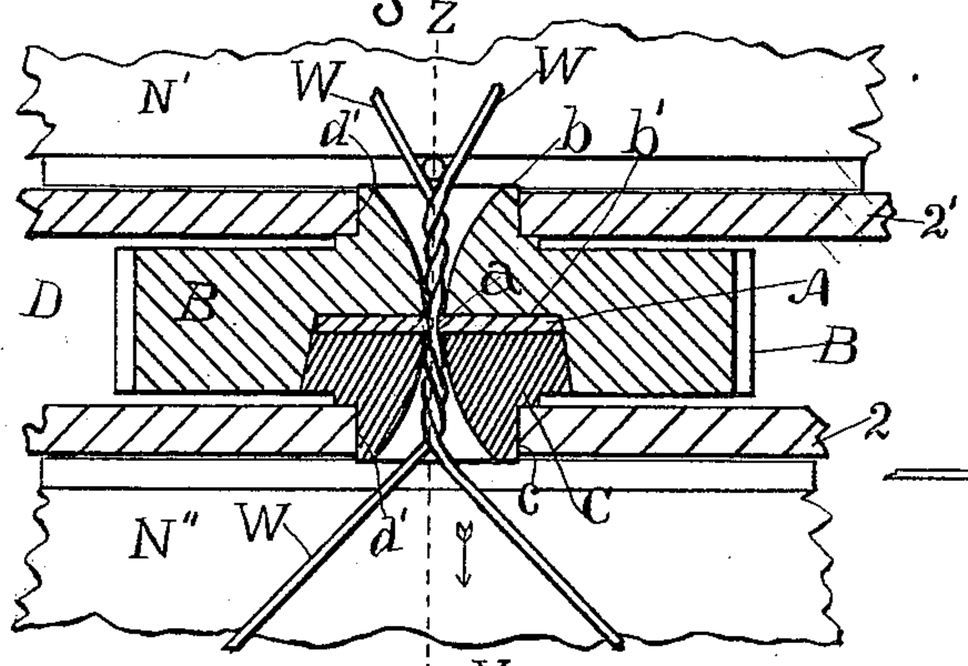

Fig. 6

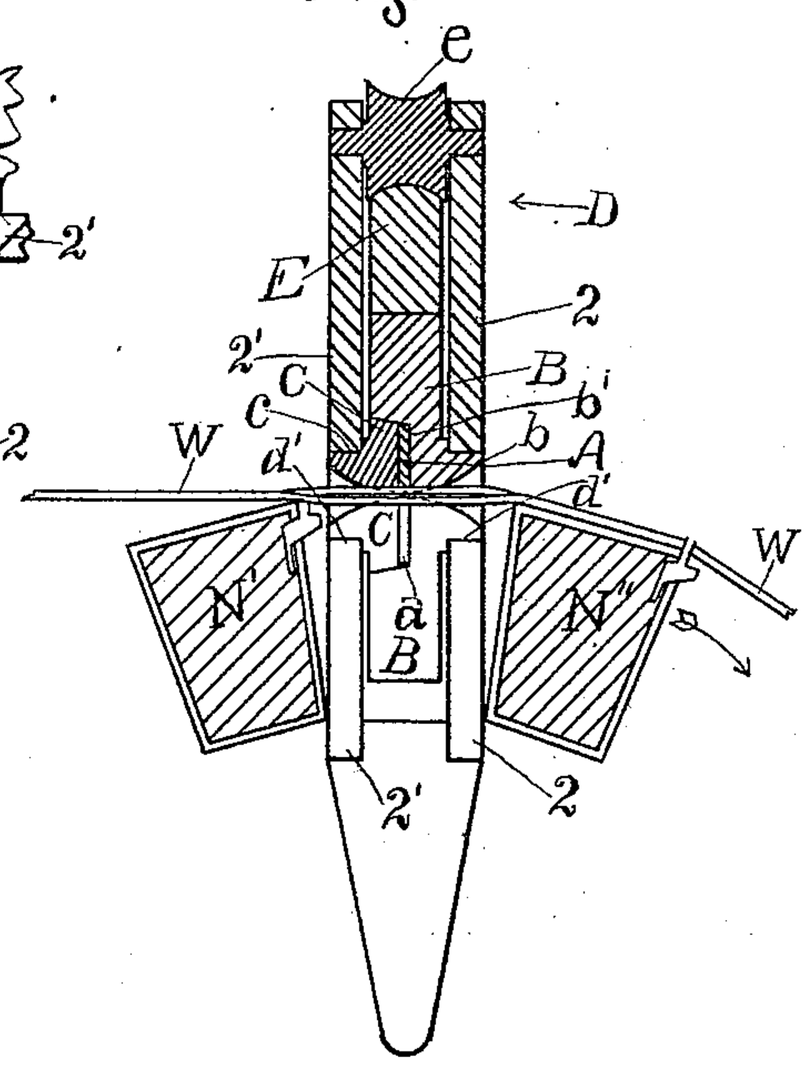

Fig. 7

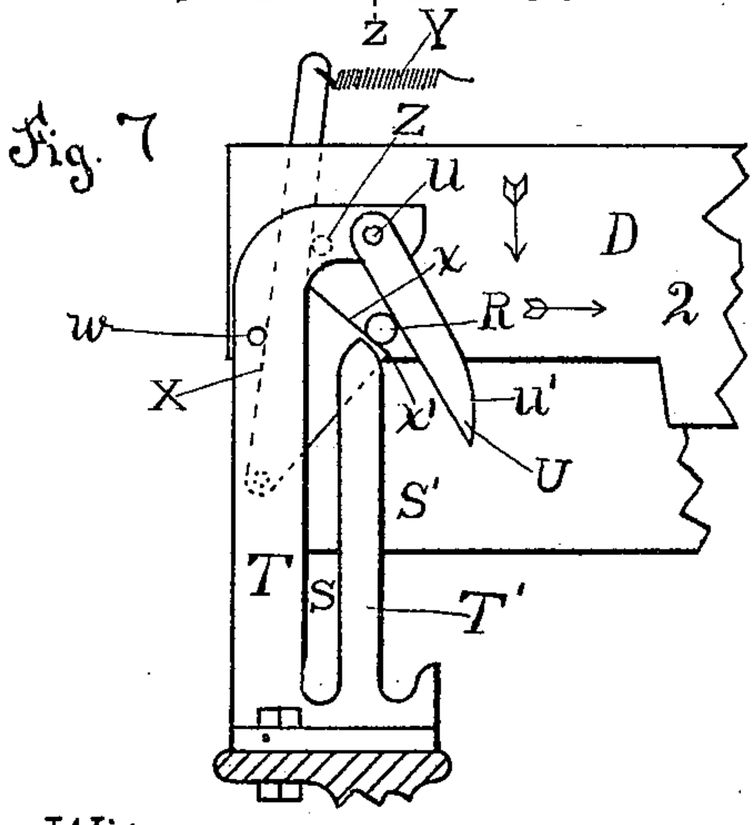

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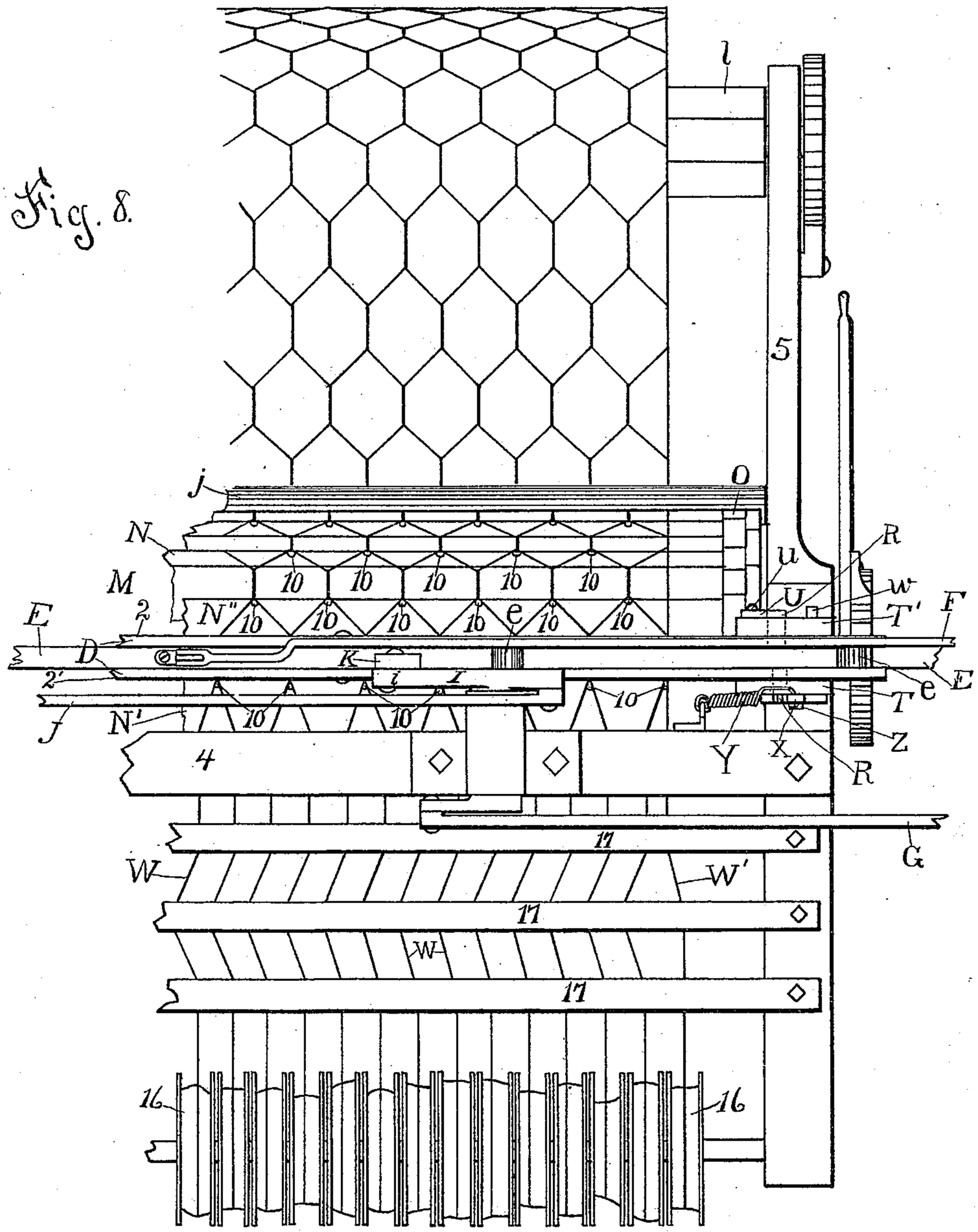
Fig. 8.



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UNITED STATES PATENT OFFICE.

THEODORE M. CONNER, OF LOS ANGELES, CALIFORNIA.

NETTED-WIRE-FABRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 459,926, dated September 22, 1891.

Application filed November 26, 1890. Serial No. 372,707. (No model.)

To all whom it may concern:

Be it known that I, THEODORE M. CONNER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Machine for Forming Netted-Wire Fabrics, of which the following is a specification.

The objects of my invention are to so construct the machine that in its operation of twisting the wires together to form the junction of the meshes there will be no movement of the wires except at the junction twisted, thus dispensing with all untwisting mechanism heretofore necessary between the twisters and the feed-spools or bales of wire; to so construct the machine that the wire may be fed direct from the bale without spooling, and thus to reduce the frequency of splicing; also to so construct the machine as to allow the use of larger and stronger twisting mechanism for a mesh of a given size than could heretofore be employed.

A further object is to produce a machine which will uniformly and invariably twist both wires of the mesh alike, and which will form a wire fabric which can be loosened or tightened after it is secured in its place of use and the junctions of which cannot be displaced by any strain upon the fabric even though such strain be sufficient to break the wires of which the fabric is formed.

A further object of my invention is to provide a suitable mesh-forming bed for gaging the size of the mesh and passing the fabric through the machine, and to so construct such bed that it will release the woven fabric and allow it to be led from the machine.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective view of the machine in operation, the same being arranged to be operated by hand-power. Fig. 2 shows a fragment of one end of the machine, the twister-bar being shown on its downward movement to enter the space between the slats N′ N″, as indicated by the large arrows having their points inserted between such slats. Fig. 3 is an end view of the mesh-forming bed and a fragment of the frame, and illustrates the mechanism for releasing the woven fabric from such bed. Fig. 4 is an axial mid-section on the line *y y*, Fig. 3, of a fragment of the mesh-forming bed attached to the frame. Fig. 5 is a horizontal mid-section of the twister on line *x x*, Fig. 2, and a fragment of the twister-bar. A top view of a fragment of two slats of the mesh-forming bed is also shown. Fig. 6 is a vertical cross-section of the twister-bar midway of one of the twisters, as indicated by line *z z*, Fig. 5. Two of the slats of the take-off roller are also shown in cross-section. This shows the position the wires assume when fully inserted in the slot. Fig. 7 is a plan elevation of one end of the twister-bar, showing the shifting-triggers in position for shifting the descending twister-bar to the right of the position shown in this figure. Fig. 8 is a plan view of one side of the machine.

The feature of my invention whereby I dispense with all untwisting mechanism consists in what I denominate a "rotatory axle-twister plate or die," which I employ instead of the rotatory peripheral twister-plate heretofore used—that is to say, that whereas heretofore the twisting of the wires has sometimes been accomplished by means of a rotating disk or plate having oppositely-arranged peripheral notches which carry the wires in making the twist my improved twister-plate is provided with a single radial notch extending from the rim substantially to the center of rotation, at which point it is of a less width than twice the diameter of the wire of which the fabric is to be woven—that is to say, it is not wide enough at its inner end to allow two of the wires designed to form the fabric to pass each other when fully seated in such slot, so that when both wires to be united are fully seated in the slot and the plate is rotated the wires will be twisted upon each other upon each side of their point of engagement with the plate. This produces what I term a "right and left hand twist," which is clearly shown in Fig. 5. This twist is formed, starting at the middle point thereof, where the wires are tightly held together by the plate and extending both ways evenly in opposite directions without moving the wires materially except at the point twisted, the twist on one side of the plate being compensated by that on the other side, thus avoiding the necessity for untwisting mechanism.

The twister may be formed of a slotted steel plate or die A, seated in the slotted gear-wheel B, and is preferably arranged with its slot *a* extending in beyond the center of rotation of the plate a distance equal to the diameter of the wire to be used, so that the point of contact of the two wires when fully seated in the slot ready for twisting will be the axis or center of rotation of the plate. The slotted gear-wheel B is provided on one side with an arbor *b* and on the other side with a socket *b'*, arranged to receive the slotted steel-twister plate or die A and the arbor-plate C, provided with the arbor *c*.

In practice the twisters consisting of the gear-wheel, twister-plate, and arbor-plate are journaled in bearings *d'*, arranged in the twister-bar D at intervals corresponding to the width of mesh desired, and the twister-bar is provided with outwardly-widened wire-guiding slots *d*, extending, respectively, from the bearings *d'* to the edge of the bar to admit the wires to the slotted arbors or journals *b c* and plate or die A.

E is the twister rack-bar, which is arranged to mesh with the twister-gears B to rotate them simultaneously when moved longitudinally.

F is a pitman, and G a lever for operating the rack-bar E by hand; but it will be understood that various means and forms of mechanism may be substituted for such pitman and lever without altering the principle of my invention. Anti-friction rollers *e* are arranged to hold the rack-bar in engagement with the gear-wheels.

The twister-bar D is mounted in guideways H, and is connected with mechanism to reciprocate it in the line of the slots *d*. The mechanism for reciprocating the twister-bar may consist, as shown, of the bell-cranks I I', pitman J connecting them, the pitmen K K' connecting the bell-cranks with the twister-bar and the lever L for operating the cranks.

In the machine shown in the drawings the twister-bar D is moved down and up to and from the mesh-forming bed M. The cylindrical rotatable mesh-forming bed M, which carries the wires W, is arranged parallel with and in the path of the reciprocating twister-bar, and is formed of a series of slats N, arranged in cylindrical form and secured at their respective ends at intervals apart to the head-plates O. Only one of the head-plates is shown, this being sufficient to illustrate them both, as they are duplicates. The twister-bar is parallel with the mesh-forming bed, and is arranged to move toward the axis of such bed, so as to become inserted far enough into the space between two of the gage-slots N, so that the wires are received by the twister, as shown in Fig. 6. When thus inserted, the twister-plate is rotated to twist the wires, and the bar is then withdrawn from between the slats. The twister-plates are rotated by reciprocating the twister-rack E in either direction by operating the lever G. In practice the twist of one end of a row of meshes extending across the fabric is formed by shifting the twister-rack E in one direction, and the twist for the other end of the same row of meshes is formed by shifting the rack in the other direction. The wires pass through the machine at right angles to the twister-bar, and are guided and held by suitable means, such as the wire-guide fingers Q Q, at uniform distances apart equal to half the width of mesh desired. The mouths of the twister-slots *d* are wider than the space between two wires, and are arranged to embrace two of these wires on the downward movement of the twister-bar, thus bringing the wires together in the slot *a* for twisting. The selvages, however, only require to be twisted alternately—*i. e.*, each selvage-wire W' must be joined to its mesh-wire only at each alternate operation of the twister-bar. For this reason I provide the selvage-notches P P' to receive the selvage-wires when the twister-bar is brought into a proper position for that purpose. These selvage-notches may be formed, as P, by splitting one of the pointed stretching or guiding teeth V, or at the ends of the bar it may be formed by dispensing with the outer half of the outer tooth V'', so that upon the downward movement of the bar the selvage-wire will be wholly outside of the teeth of the bar.

In order to form a mesh, it is necessary that the respective wires be united with their adjacent wires alternately upon opposite sides, and for this purpose I provide shifting mechanism for shifting the twister-bar horizontally the distance between the wires, so that at each alternate movement the selvage-wire on one side and its adjacent wire are twisted together, while the selvage-wire on the other side of the fabric is left untwisted, and vice versa, the next time. This shifting of the twister-bar also causes each mesh-wire of the fabric to be alternately joined with the adjacent wires upon its opposite sides. The shifting mechanism shown consists of a pin R, projecting from each side of the twister-bar, the cleft post T' and standard T forming runways S, S', and H for such pin and twister-bar, switch-dogs arranged to guide the pin into such runways S and S' alternately, and means for reciprocating the bar perpendicularly and axially. The shifting-guideways S S' are formed by the standard T and post T', which standard and post are cleft or divided by the slot H, which forms the guideways for the twister-bar. The pendent switch-dog U is a plain bar beveled on one side at the point and pivoted by pivot *u* at its upper end to the front side of standard T and arranged to hang with its point between the guideways S S', formed by the post and standard, while the beveled edge *u'* projects into the inner guideway S', so that the pin R when ascending in the guideway S' will engage the beveled edge *u'* to swing the dog outward.

It will be observed that the machine shown in the drawings is designed to be operated by

levers arranged on the left side of the view. For convenience of description I will call this the "operator side." The levers *i i'*, to the ends of which are respectively pivoted the pitmen or swing bars K K', which support and actuate the twister-bar, extend from their pivotal points at I I' away from the operator side, so that the upward movement of the end of such levers will not only raise the twister-bar, but will also tend to swing it toward the operator side, on which are arranged the switch-dogs. It will thus be seen that when pin R is in the bottom of guideway S' the upward movement of the twister-bar will tend to force the pin outward against the post T' and the pendent dog U, and that when the pin R reaches the top of the post T' it will press the dog U outward until it engages the outer stop *w*, which prevents further upward movement of the bar. Then if the bar is lowered the outward swing of the twister-bar forces the pin R to enter the guideway S and descend to the bottom thereof, thus allowing the dog U to swing back into its original position shown by dotted lines in Fig. 2.

The gravity switch-dog X is pivoted to the rear side of post T by its lower end, and is provided at its upper end with a sloping shoulder *x*. It is held normally in the path of the shifting-pin R by means of a spring Y, and the inner corner *x'* of the dog normally extends into the path of such pin when the pin travels upward at the top of guideway S.

Z is a stop (shown in dotted lines in Fig. 2) to prevent the dog X from being thrown inward too far. When the pin R is in guideway S and the twister-bar is raised, the pin R in its upward movement engages the under side of dog X and forces such dog outward until the pin rises above the corner *x'*. Then the spring Y draws the dog into its normal position. When the twister-bar is again lowered the pin R strikes upon the top of the sloping shoulder or face *x*, and as the twister-bar is further lowered the pin R slides down along the shoulder *x*, and thereby is guided back into the guideway S'. In its upward movement from guideway S' the pin R engages the corner *x'* and carries the dog X along with it until the pendent dog U, striking against the stop *w*, prevents the pin from rising above the shoulder. Thus the passage into S is always open when the bar is shifting toward the operator side and is always closed when the bar is shifting from the operator side.

The twister-bar is formed of two side or frame plates 2 2', having a series of spread or guide teeth V V', &c., clasped between their lower edges and secured by screws or bolts 3. The twister-gears B are inserted before the plates are secured together.

4 represents the guide or gage frame, to the lower edge of which the wire-guide fingers Q are fixed. These guide-fingers are preferably of steel, as they are required to sustain considerable strain when the wires are drawn together by the teeth V.

After each operation of twisting the fabric and wires have to be shifted forward, and to accomplish this I provide means for moving the slats across the path of the twister-bar.

The cylindrical mesh-forming bed M is mounted upon an axle or shaft *m*, journaled in the frame 5 of the machine. I provide suitable means for its rotation. The means shown consist of the ratchet-wheel 6 and the lever 7 and pawl 8. Suitable means, such as the stop 9, may be provided to determine the extent of the movement of the lever and the consequent movement of the mesh-forming bed and length of mesh. The slats of the cylindrical bed are provided with wire-holding studs or pins 10, arranged along the front of the slat at intervals apart equal to the desired width of mesh. The studs upon each slat are so arranged that they alternate with the spaces between the studs upon the adjacent slats. This will be more fully understood from Fig. 2, in which the studs 10 on the slat N' are set to pass through the alternate spaces 11 between the first and second, third and fourth, and fifth and sixth fingers Q. The row of studs in the next slat N'' is arranged to pass through the spaces 12, and the studs on the next slat N are arranged to pass through the spaces 11.

In operation when the bed is rotated the studs catch into the angle of the mesh, and thus carry the fabric through the machine. The device for releasing the fabric from this bed is illustrated in Figs. 3 and 4. The slats are pivoted at the inner edges of their ends to the head-plate O by pivots *d''*. The slats are respectively provided with followers *f f*, respectively secured to the slats and having a rearwardly-projecting engaging or follower point 14, which rests upon a stationary form-disk *g*, having its periphery partially circular, but provided with the release-jog *h*, arranged with relation to the point where it is desired to release the fabric from the bed. The followers are so arranged that when their engaging point or rear ends engage the circular portion of the rim of the form-disk *g* they hold their respective slats radial with the axle *m* of the bed; but when by rotation of the bed the followers are caused to engage the jog *h* the slat is allowed to tip toward the direction from which the bed revolves, thus withdrawing the pins from the junction of the mesh and allowing the fabric to be led from the cylindrical bed around the take-off roller *j* to the main fabric-receiving roller *l*.

11 represents the tension device, and 16 16 represent spools, on which the bales of wire may be placed. It is to be understood, however, that such spools are non-essential, as the bales can simply be hung upon a nail or otherwise disposed to allow the wire to be drawn therefrom into the machine.

13 represents a band connecting the axle *m* with the fabric-roller *l*.

In the accompanying drawings the machine is arranged horizontally; but it is obvious

that it may be arranged perpendicularly or otherwise without altering the principle of its operation.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the slotted vertically-reciprocating twister-bar, the series of twisters journaled therein, the rack engaging such series of twisters, means for holding the wires, and means for guiding the wires.

2. The combination of the vertically-reciprocating twister-bar provided with the wire-guiding slots, the rotatable slotted axial twister-plates journaled in the twister-bar, means for holding the wires apart, means for guiding the wires, means for rotating the plates, and means for reciprocating the twister-bar.

3. In a machine for forming netted-wire fabrics, the combination of the slotted twister-plate A, the slotted arbor-plate C, the slotted twister gear-wheel provided on one side with an arbor and on the other side with a socket to receive the twister-plate and the arbor-plate, the slotted twister-bar provided with bearings for the arbors, the twister-bar rack arranged to mesh with the gear-wheel, means for holding the wires, means for guiding the wires, and means for reciprocating the twister-bar.

4. The combination of the vertically-reciprocating twister-bar provided with the wire-guiding slots, the rotatable slotted axial twister-plates, means for rotating the twister-plates, means for reciprocating the twister-bar, the mesh-forming bed formed of a series of slats arranged at intervals apart parallel with and in the path of the reciprocating twister-bar and provided with the wire-holding studs, means for moving the slats across the path of the twister-bar, and means for guiding the wires.

5. The combination of the vertically-reciprocating twister-bar provided with the wire-guiding slots, the rotatable slotted axial twister-plate, means for rotating the twister-plates, means for reciprocating the twister-bar, the mesh-forming bed arranged parallel with and in the path of the reciprocating twister-bar and formed of a series of slats arranged at intervals apart in cylindrical form and provided with the wire-holding studs, means for rotating the bed, and means for guiding the wire.

6. In a machine for forming netted-wire fabrics, the mesh-forming bed comprising the combination of the head-plates, the form-disk having its periphery partially circular, but provided with the release-jog, and a series of slats pivoted at their ends to the head-plates and arranged at intervals apart to form a cylinder and provided, respectively, with the follower-point arranged to engage the form-disk.

7. The combination of the twister-bar, the pin projecting from each side of the twister-bar, the cleft post T′ and standard T, forming the runways, switch-dogs arranged to guide the pin into the runways S and S′ alternately, and means for reciprocating the twister-bar perpendicularly and horizontally.

8. The combination of the twister-bar, the cleft post and standard, the pendent beveled switch-dog pivoted to one side of the standard and arranged to hang with its point between the guideways formed by the post and standard, the outer stop, the gravity switch-dog pivoted to the other side of the standard and provided with the spring-shoulder, means for normally holding the gravity switch-dog in the path of the shifting-pin, and means for reciprocating the twister-bar perpendicularly and horizontally.

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