No. 689,488. Patented Dec. 24, 1901.

W. C. SMITH & J. HARRIS.

MACHINE FOR MAKING WIRE FENCE PICKETS.

(Application filed July 6, 1900.)

(No Model.) 4 Sheets—Sheet I.

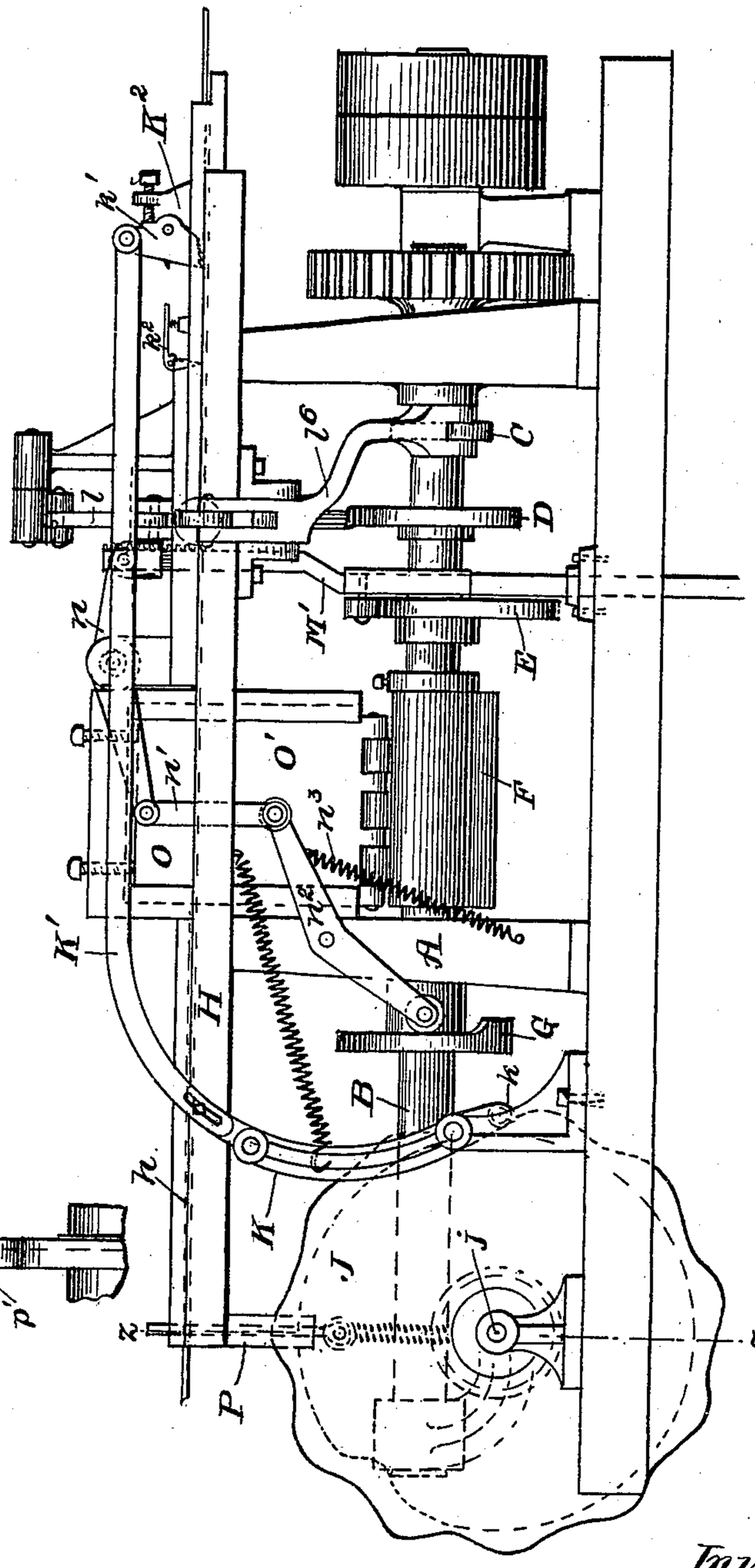

Fig. I.

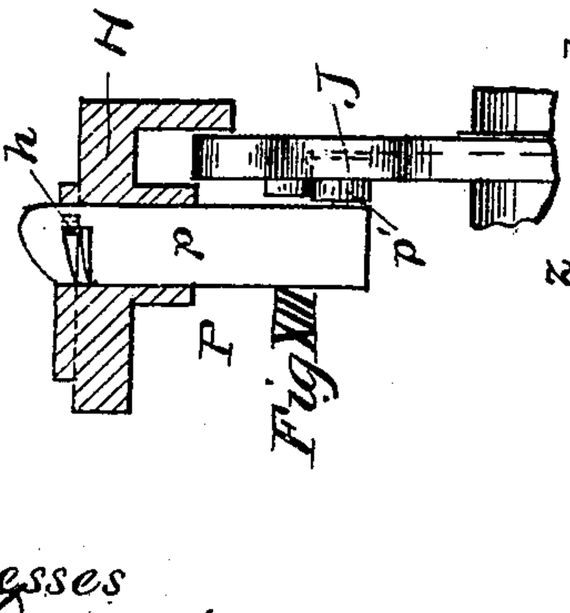

Fig. XIII.

Witnesses
D. T. Davies
A. E. Merkel

Inventors
H. C. Smith
J. Harris
by J. Ik Fray
their Attorney.

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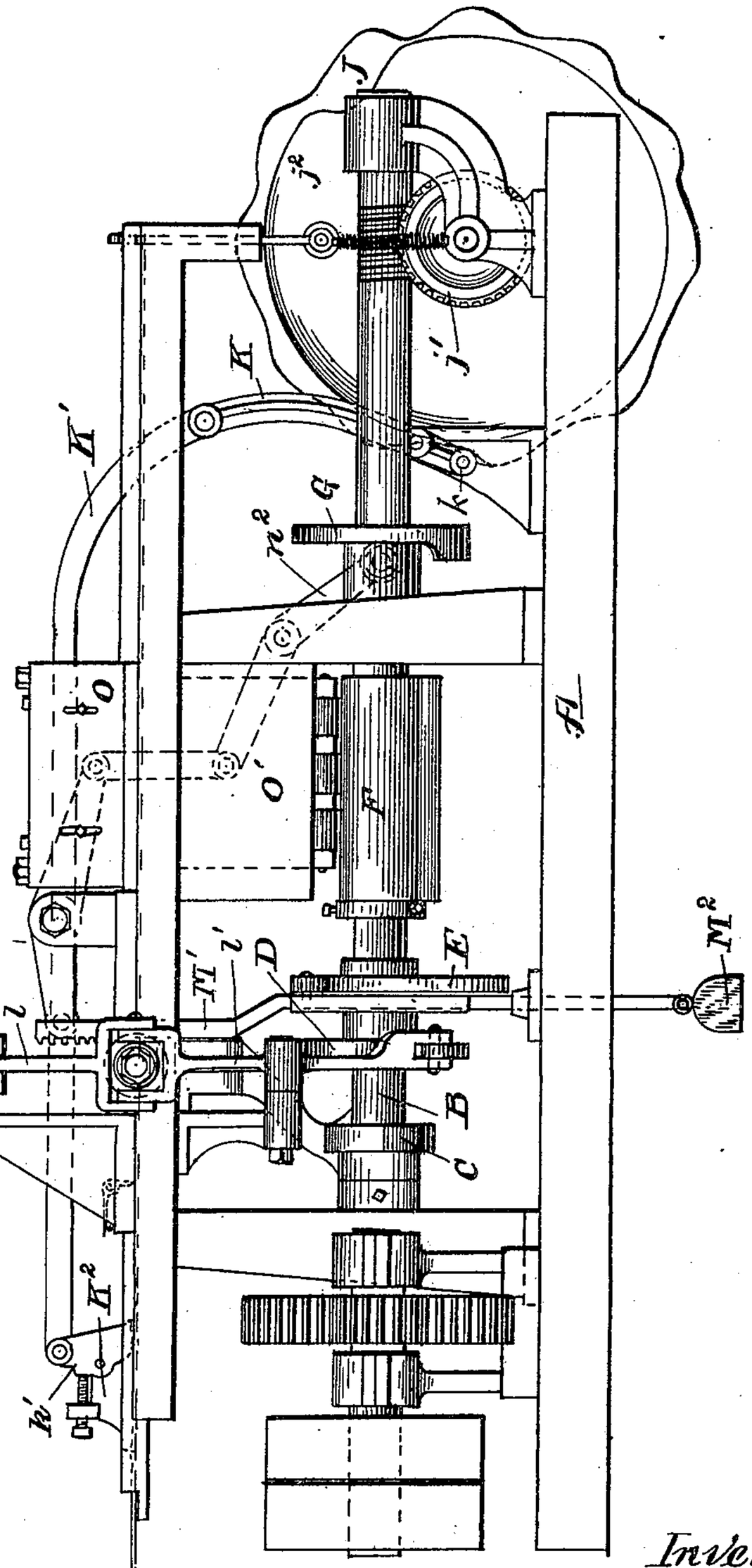
Fig. II.



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D. T. Davies
A. C. Merkel.

Inventors
W. C. Smith
J. Harris
by Their Attorney.

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(No Model.) 4 Sheets—Sheet 3.

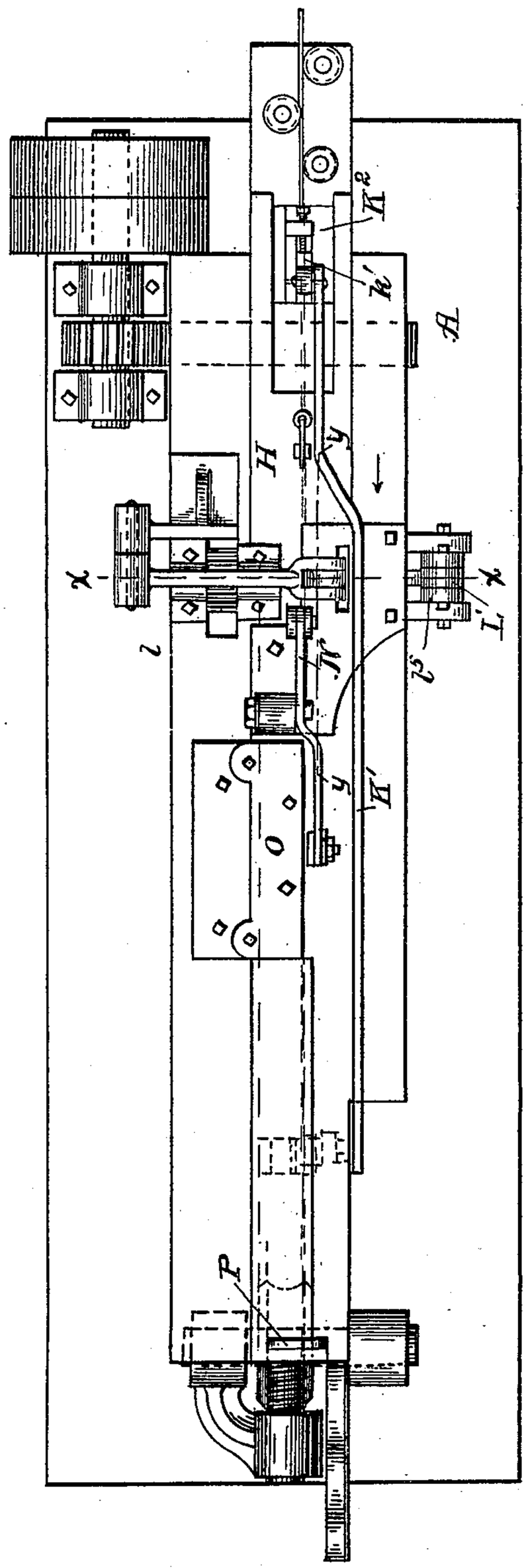

Fig. III.

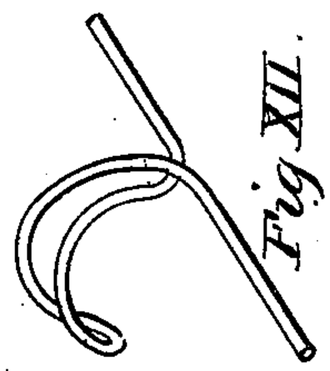

Fig. XII.

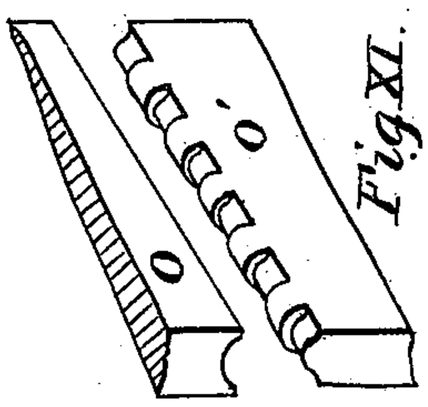

Fig. IX.

Witnesses
S. Soares
A. E. Merkel.

Inventors
W. C. Smith &
J. Harris
by Thos. G. Orr
their Attorney.

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W. C. SMITH & J. HARRIS.

MACHINE FOR MAKING WIRE FENCE PICKETS.

(Application filed July 6, 1900.)

(No Model.) 4 Sheets—Sheet 4.

Fig. IV.

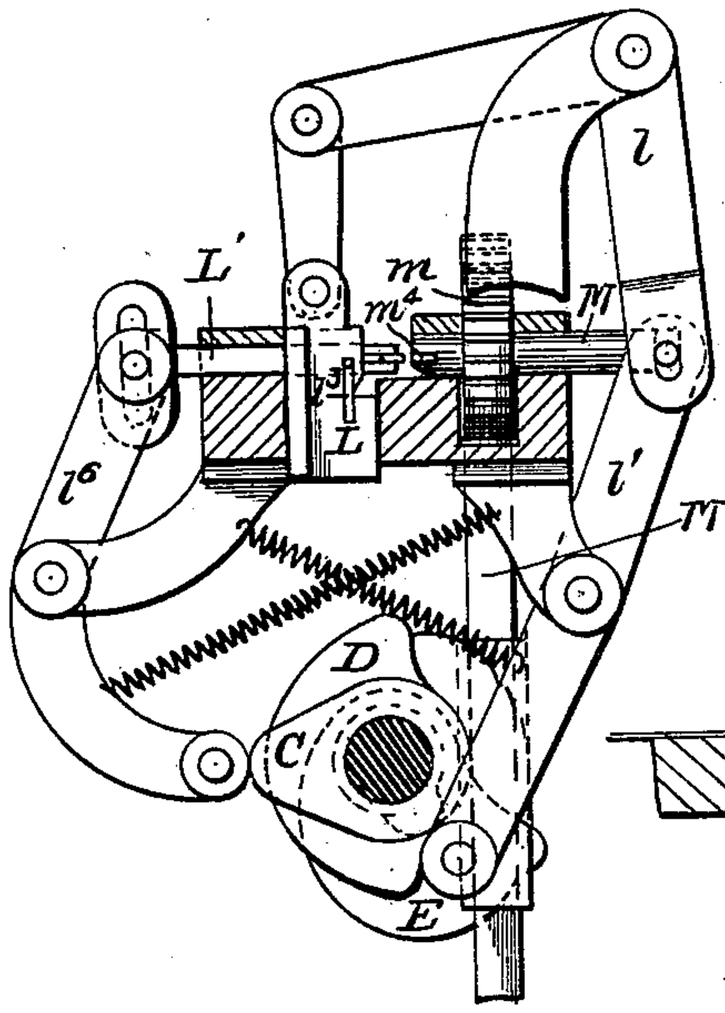


Fig. X

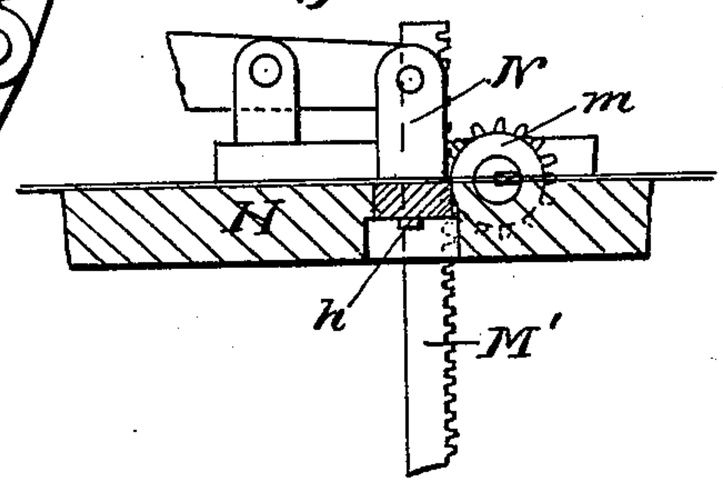


Fig. VI.

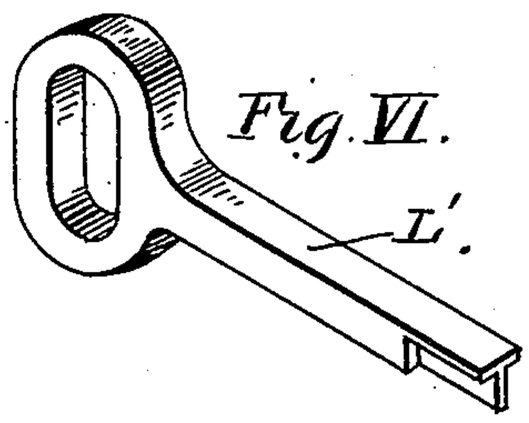


Fig. V.

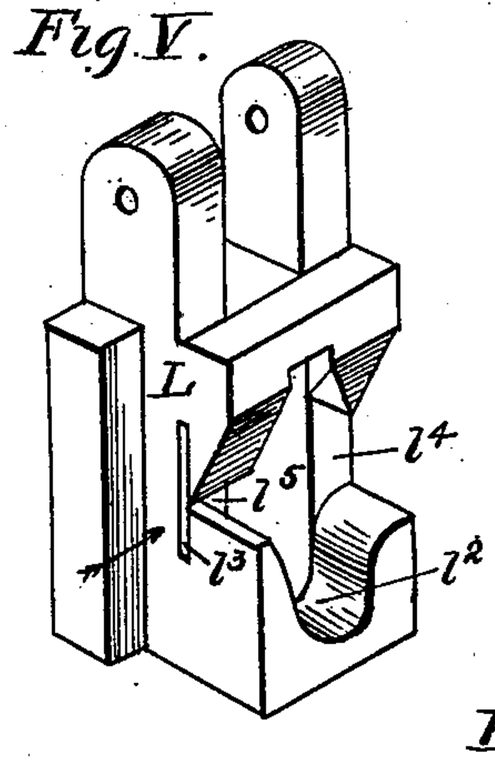


Fig. VII.

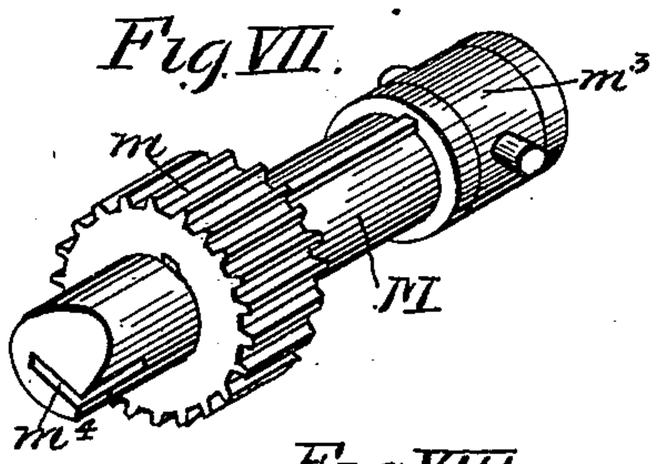
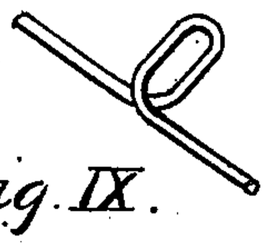


Fig. VIII.

Fig. IX.



Witnesses
D. T. Davies
A. E. Merkel.

Inventors
W. C. Smith
J. Harris
by E. G. Siggers
their Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM C. SMITH, OF GLENVILLE, AND JONATHAN HARRIS, OF CLEVELAND, OHIO, ASSIGNORS TO SIMEON C. DAVIS, OF CLEVELAND, OHIO.

MACHINE FOR MAKING WIRE-FENCE PICKETS.

SPECIFICATION forming part of Letters Patent No. 689,488, dated December 24, 1901.

Application filed July 6, 1900. Serial No. 22,730. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM C. SMITH, a resident of Glenville, and JONATHAN HARRIS, a resident of Cleveland, county of Cuyahoga, and State of Ohio, citizens of the United States, have invented a new and useful Improvement in Machines for Making Wire-Fence Pickets, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

Our invention relates to machines for making wire fencing, and particularly to devices for forming loops upon one or more of the component wires for securing such wires at their respective crossing-points.

Such device consists of means hereinafter fully described.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a front elevation of a device constructed according to our invention and especially designed to form a loop upon the upright stays or pickets of an improved wire-fence construction. Fig. II represents a rear elevation of same. Fig. III represents a plan view of same. Fig. IV represents a transverse cross-section taken upon the plane indicated by line *x x*, Fig. III. Figs. V, VI, and VII represent perspective views of detail portions of the mechanism for performing the first step in the looping operation. Figs. VIII and IX represent perspective views of a portion of wire, illustrating the loop in two different stages of its formation. Fig. X represents a part of a transverse section taken upon the plane indicated by line *y y*, Fig. III. Fig. XI represents a perspective view of a portion of the mechanism for performing the last operation. Fig. XII represents a perspective view of a portion of wire, illustrating the loop in its completed form; and Fig. XIII represents a part of a transverse section taken upon the plane indicated by the line *z z*, Fig. I.

Upon the lower portion of the frame A of the machine is mounted in suitable bearings an operating-shaft B, upon which are secured a series of operating-cams C, D, E, F, G, and J, which actuate a series of mechanisms mounted upon a table H, secured to the upper part of the frame. Said table is provided with a guiding-groove *h*, Figs. III and X, which passes through the field of operation of the said series of mechanisms and is adapted to receive and guide the wire prior and after the various operations have been performed. Said series of mechanisms consists of a looping device, a twisting device, a bending device, and a cut-off device, all operating in conjunction with a feeding device adapted to feed the wire longitudinally and intermittently, said operations each occurring during the period intermediate of two successive feeding operations or during a period in which the wire remains at rest in the respective fields of operation of such devices. Said feeding device comprises the cam-wheel J, Fig. I, mounted upon a shaft *j*, upon which is secured a worm-wheel *j'*, driven by a worm secured to the operating-shaft B. The periphery of said cam-wheel is provided with a succession of cam-surfaces of a depth and spaced in accordance with the distances which it is desired to preserve between successive loops upon the wire, as will further appear. These cam-surfaces engage a downwardly-depending end of a lever K, the engaged extremity being provided with an anti-friction-roller *k*, Fig. II. The upper end of said lever K is adjustably secured to a rod K', which extends longitudinally of the machine-frame and is pivoted upon the upper end of a dog *k'*, in turn pivoted upon a cross-head K^2, which slides over and in the direction of the guiding-groove near that end thereof at which the wire enters such groove. That surface of said dog *k'* contiguous to said groove is provided with teeth adapted to bite the wire when the cross-head is given a forward reciprocal movement, the dog having an angular position such that such lower tooth-surface will be depressed upon the forward movement of the upper end of the dog, as is readily understood from the drawings. It is hence seen that the rotation of the cam-wheel effects the reciprocation of

the cross-head and the depression of the toothed dog-surface during each forward stroke of such reciprocation. The wire passing into the groove may hence be intermittently gripped and fed during each such forward movement. In order to prevent the wire from being pulled backward during the return stroke of the cross-head and consequent movement of the dog, any suitable means, such as a spring-actuated dog k^2, Fig. I, may be employed to grip the wire during such stroke.

The first step in the formation of the fence consists in indenting the wire to form the structure illustrated by Fig. VIII. To effect this step, a looping-die L is located in the path of the wire and is reciprocable in a direction transverse with respect to such path, (vertically and perpendicularly, as illustrated.) Such movement is effected by means of a bell-crank l and lever l', actuated by the cam D, Fig. IV. Said die is provided with a loop-forming aperture l^2, open at its upper portion, and a slot l^3, elongated in the direction of reciprocal motion of the die and in alinement with the guiding-groove h, Fig. V, through which the wire is adapted to pass and lie during such reciprocal movement of said die. Said slot l^3 is provided with a lateral opening l^4 at that extremity opposite the point of entrance of the wire, the direction of entrance of such wire into said slot being indicated by the arrow in Fig. V. An opening l^5, opposite the loop-forming aperture l^2, is formed for the admission of a loop-forming thrust-bar L', which in conjunction with said die-block forms the previously-mentioned structure. Said bar is reciprocated into and out of the die-forming aperture through the medium of a lever l^6, actuated by the cam C, as will be readily understood from the construction illustrated in Fig. IV. Said thrust-bar is formed with a T-shaped end, Fig. VI, the upright member of which performs the operation and the cross-member of which prevents the wire from rising and becoming disengaged from said bar. Located opposite said thrust-bar and having its axis parallel with the direction of movement of said bar is a twisting device consisting of an oscillatory shaft M, provided with a pinion m, splined upon it, whereby said shaft may be reciprocated during its oscillation, Fig. IV. Such oscillation is produced by a rack M', Figs. I and X, engaging said pinion and actuated upwardly by cam E and downwardly by a weight M^2, Fig. II. The reciprocal movement of said shaft is effected by the lever l', which engages a rotatable but longitudinally-fixed collar m^3, Fig. VII. The end of said shaft contiguous to the die-block is provided with a transverse slot m^4, which cuts the cylindrical shaft-surface, as shown, and is of a width sufficient to admit the loop when formed. Such described twisting device performs the second step in the operation, as will be further described. A holding or clamping device N, Figs. I and X, is located in the vicinity of said die-block and is actuated to hold the wire firmly upon the table while the looping operation is taking place by means of a system of levers n, n', and n^2, actuated by cam G and spring n^3, as illustrated in Fig. I. Beyond the holding device and in the path of the wire is located a pair of dies, Fig. I, an upper stationary female die O, and a lower reciprocable male die O', the reciprocation being effected by cam F, which engages a series of antifriction-rollers upon the lower end of said male die.

The intaglio of the female die consists of a simple cylindrically-concave surface, as illustrated in Fig. XI, and the working face of the male die consists of a plurality of equidistant alternately-occurring relatively raised and depressed convex cylindrical surfaces, as shown in said figure.

Near the end of the table is located a cutting-off or shearing device P, consisting of a suitable knife p, Fig. XIII, reciprocated by means of a cam-surface j^2, formed upon the inner face of the cam-wheel J, such surface engaging a roller p', secured to the knife p, once during every revolution of said wheel.

The cams are located so as to operate the several above-described devices, as follows: The rotation of the operating-shaft operates the feeding device to feed the wire intermittently and longitudinally along the guiding-groove h and through the field of operation of the several described devices, one feeding operation taking place for each cam-surface upon cam-wheel J, the number of such surfaces hence determining the number of loops formed upon each stay or picket, since the wire is severed by the cutter P once during each revolution of said cam-wheel. The distance of each such feeding movement is determined by the depth of the said cam-surface, as before mentioned, and is made an exact multiple of the distance between two successive raised surfaces of the die O', such arrangement being had for purposes which will further appear. The wire being fed, as above described, into the field of operation of the looping-die and the looping thrust-bar through the slot l^3, the said bar enters the die and presses the wire into the loop-forming recess l^2, which gives said wire the form illustrated in Fig. VIII. Simultaneously with the latter part of such operation the twisting-shaft M is advanced, with the lateral opening of the slot m^4 facing away from the direction of feeding movement of the wire. During such advance movement the formed loop enters the said slot and upon the withdrawal of the thrust-bar from the loop which follows its advance the cam E is caused to operate the rack to give said shaft a half-turn, thereby twisting the loop into the form shown in Fig. IX. The looping-die is during the latter part of the twisting operation then depressed so as to bring the lateral opening l^4 in the line of the movement of the loop resulting from the subsequent feeding

operation. Such movement takes place at the time the twisting-shaft has completed its operative half-turn, thereby permitting the loop to simultaneously emerge and be disengaged from the said bar and the looping-die. The loop, formed as above described, is now advanced to the bending-dies O and O', which give it a concave formation, as illustrated in Fig. XII, one lateral member being of greater convexity than the other. Such difference of curvature is obtained by causing one such lateral member to be fed upon a raised die portion and the other upon a depressed die portion. The distance of feed being always an exact multiple of the distance between two successive raised portions of the die, it is seen that such multiple may be predetermined and made of different denominations by varying the depth of the cam-surfaces upon the cam-wheel J, and the distances between successive loops upon the wire varied, at the same time producing an unvarying form of loop. The wire now being further fed is severed at the proper point and forms a completed stay, having a succession of loops of the above-described formation formed at intervals upon it.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means covered by any one of the following claims be employed.

We therefore particularly point out and distinctly claim as our invention—

1. In a machine for manufacturing wire fence, the combination with means for intermittently feeding the wire longitudinally, of means for forming a loop, loop-twisting and loop-bending means; said loop forming, twisting and bending means severally operative during the period intermediate of two successive feeding movements of the wire.

2. In a machine for manufacturing wire fence, the combination with means for intermittently feeding the wire longitudinally, of means for forming a loop, loop-twisting, loop-bending and wire-holding means; said loop forming, twisting, bending and holding means severally operative during the period intermediate of two successive feeding movements of the wire.

3. In a machine for manufacturing wire fence, the combination of means for feeding wire longitudinally, a die-block reciprocable into and out of the path of feed in a direction transverse to said path, and a bar reciprocable into and out of said path in a second such transverse direction, and adapted, in conjunction with said die-block, to form a loop upon said wire.

4. In a machine for manufacturing wire fence, the combination of means for feeding wire longitudinally, a die-block reciprocable into and out of the path of feed in a direction transverse to said path, a bar reciprocable in a second such transverse direction adapted, in conjunction with said die-block, to form a loop upon said wire, and means for twisting said loop.

5. In a machine for manufacturing wire fence, the combination with a die-block having an aperture for the reception of a wire, of a bar adapted to enter said block in a direction transverse with respect to said aperture for forming a loop upon such wire while in said block.

6. In a machine for manufacturing wire fence, the combination with a die-block having an aperture for the reception of a wire and a loop-forming recess, of a bar adapted to enter said recess in a direction transverse with respect to said aperture for forming, in conjunction with said recess, a loop upon such wire while in said block.

7. In a machine for manufacturing wire fence, the combination with a looping-die and an operating thrust-bar, of a slotted shaft adapted to seize the loop when formed and by a semirotation twist it, a temporary holder for the wire while the loop is being formed, dies for curving the twisted loops, and means for feeding the wire to form loops at predetermined intervals thereon.

8. In a machine for manufacturing wire fence, the combination with a looping and twisting device, consisting of a vertically-movable looping-die and thrust-bar therefor, in combination with a temporary wire-holder, and means for twisting the loop when formed consisting of an oscillatory and reciprocable shaft provided with a transverse slot at the inner extremity.

9. In mechanism for looping wire, a vertically-movable looping-die, provided with a transverse wire slot, and lateral opening for the release of the loop, in combination with a thrust-bar adapted to push the wire through said die, a temporary wire-holder, and means for reciprocating said die and thrust-bar and for operating said holder.

10. In mechanism for looping and twisting wire, the combination with a looping-die, a thrust-bar and temporary wire-holder, of an oscillatory shaft adapted to advance and seize the loop when formed and by a semirotation to twist the same, with means for operating the several parts.

11. In a machine for looping wire and twisting the loops, the combination of a vertically-movable die-block and thrust-bar therefor, a temporary wire-holder, a reciprocable and oscillatory shaft provided with a transverse slot at its inner extremity, a gear through which said shaft passes, slidingly connected therewith, a reciprocating rack engaging said gear, and means for operating the rack, looping-die, thrust bar and holder, consisting of a main driving-shaft, cams thereon and intermediate levers engaging said cams.

12. In a machine for the purpose described, means for feeding the wire, consisting of a feeding-dog pivotally mounted upon a reciprocating head, and adapted to grip the wire

when advanced and release it when withdrawn, in combination with means for reciprocating the head and moving the dog to grip the wire to determine the position of the loops upon the wire, consisting of a cam-disk provided with cam-surfaces upon its periphery and a lever engaging said disk and connected with said feed-dog.

13. In a machine for looping and twisting a stay-wire at predetermined intervals, the combination of a vertically-reciprocating looping-die and reciprocating thrust-bar, a temporary wire-holder adapted to seize the wire on one side of the block while the loop is being made, and a twisting device for the loop consisting of an oscillating shaft provided with a slot extending across the forward extremity thereof, said shaft being adapted to advance and seize the loop when formed on the retirement of the thrust-bar and twist it by a semirotation, with operating means for the various parts.

14. In a machine for looping and twisting wire, the combination of a looping die-block reciprocable vertically and provided with a vertical wire slot laterally open for the passage of the loop at one side, an oscillatory and reciprocable twisting-shaft provided with a gripping-slot to receive the loop, and means for operating the thrust-bar, oscillating the shaft and reciprocating the twisting-shaft and looping-die so that the twisting-shaft shall advance as the thrust-bar retires, and the advance of the twisting-shaft shall be simultaneous with the rise of the loop-die, whereby the opening of the side of the slot shall be in position to permit the escape of the loop when formed.

15. In a machine of the character described, mechanism for bending wire loops into a semicircular shape, one side of the loop being bent more than the other, consisting of male and female dies, the female die being of a simple concave form, and the male die convex, but provided with alternate projections and depressions.

16. In a looping device for wire, a die-block provided with an opening through which the loop is formed, and a vertical slot through which the wire passes, the said slot being centrally open upon one side of the loop-opening for the passage of the loop.

17. In a looping and twisting mechanism, a vertically-reciprocable die-block provided with a wire-slot open at one side, and a horizontally-reciprocating looping-bar, in combination with a bell-crank connecting the die-block and twister and a lever connected with the twister at one end and engaging a cam upon the main shaft of the machine at the other extremity.

Signed by me this 12th day of June, 1900.

WILLIAM C. SMITH.

Attest:

D. T. DAVIES,
A. E. MERKEL.

Signed by me this 15th day of June, 1900.

JONATHAN his × mark HARRIS.

Attest:

W. P. HARRIS,
E. S. MARSH.