H. L. CRAVEN.

WIRE WORKING MACHINE.

APPLICATION FILED DEC. 9, 1912.

1,085,594.

Patented Feb. 3, 1914.

4 SHEETS—SHEET 1.

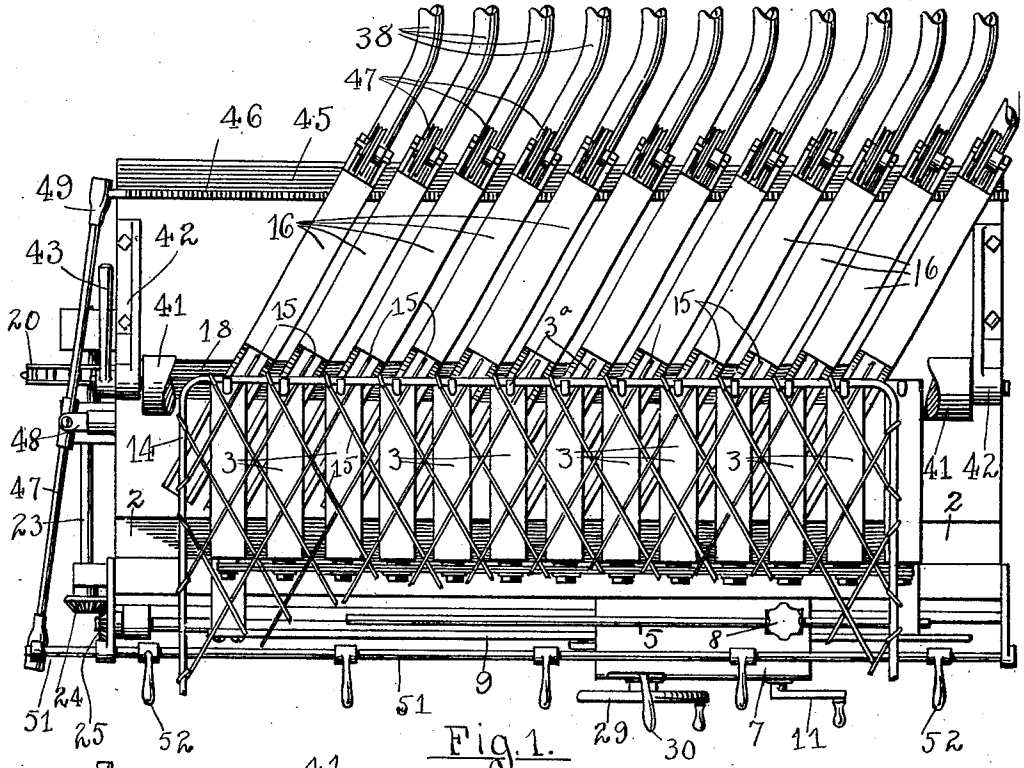


Fig. 1.

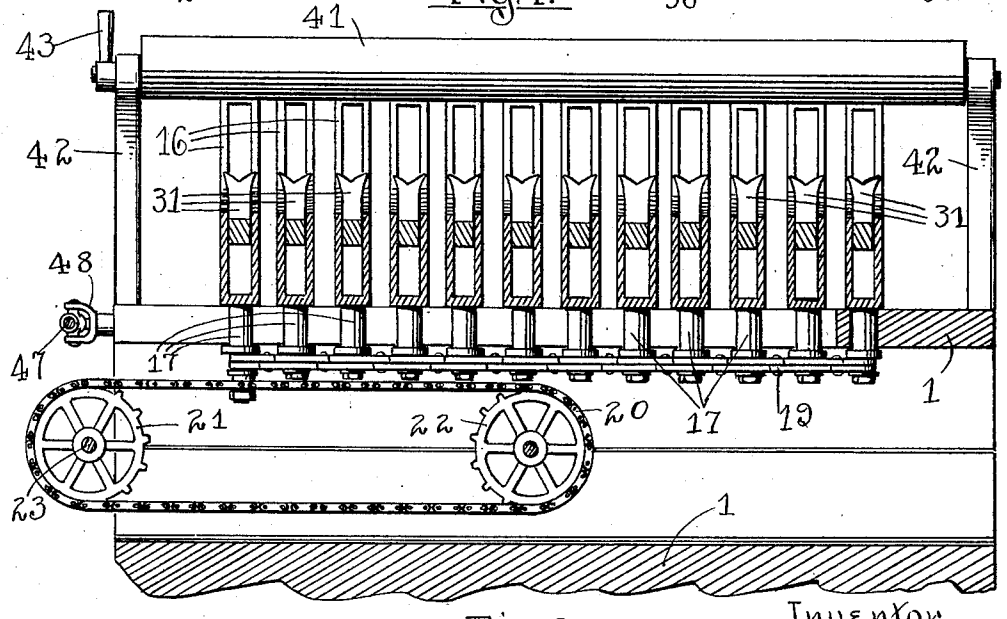


Fig. 2.

Witnesses

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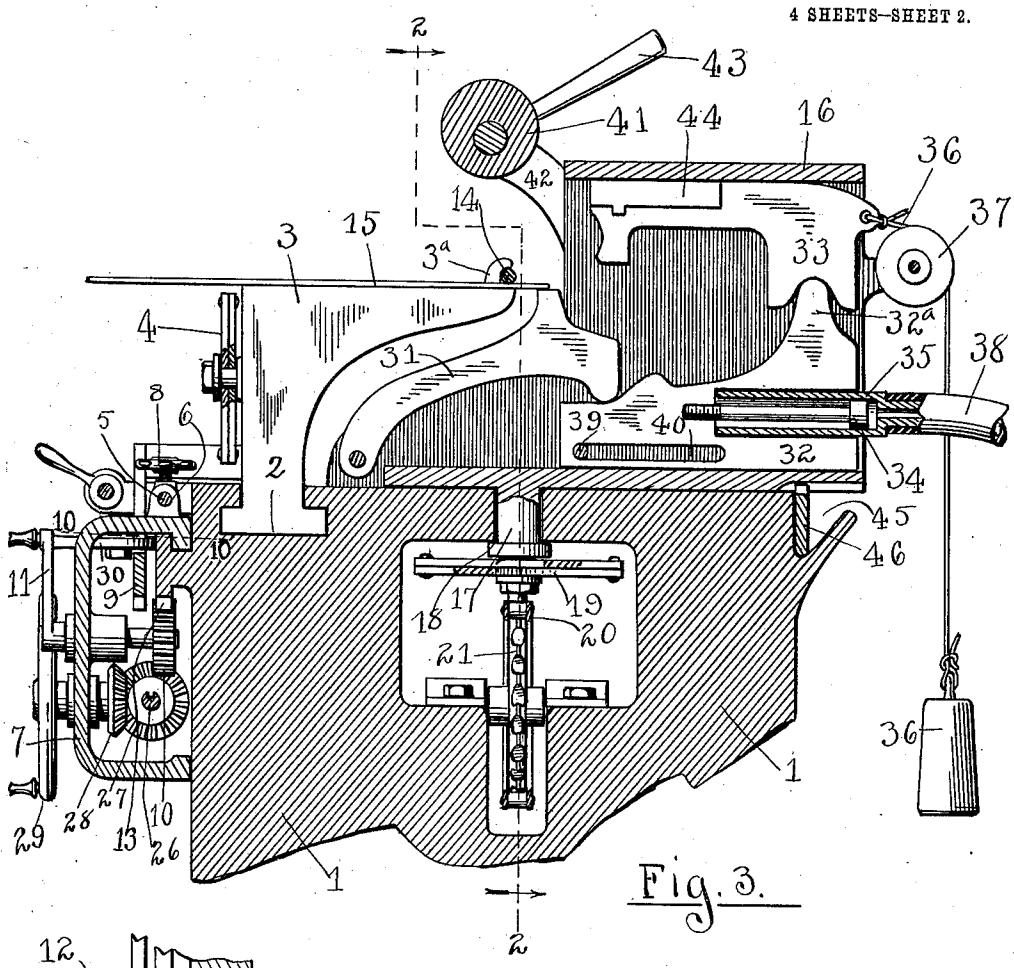


Fig. 3.

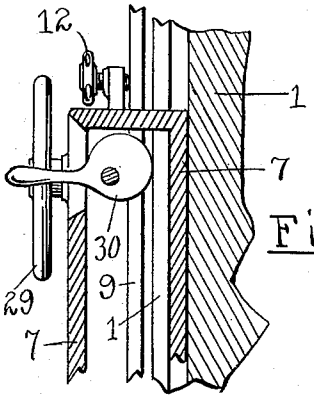


Fig. 10.

Witnesses

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4 SHEETS—SHEET 3.

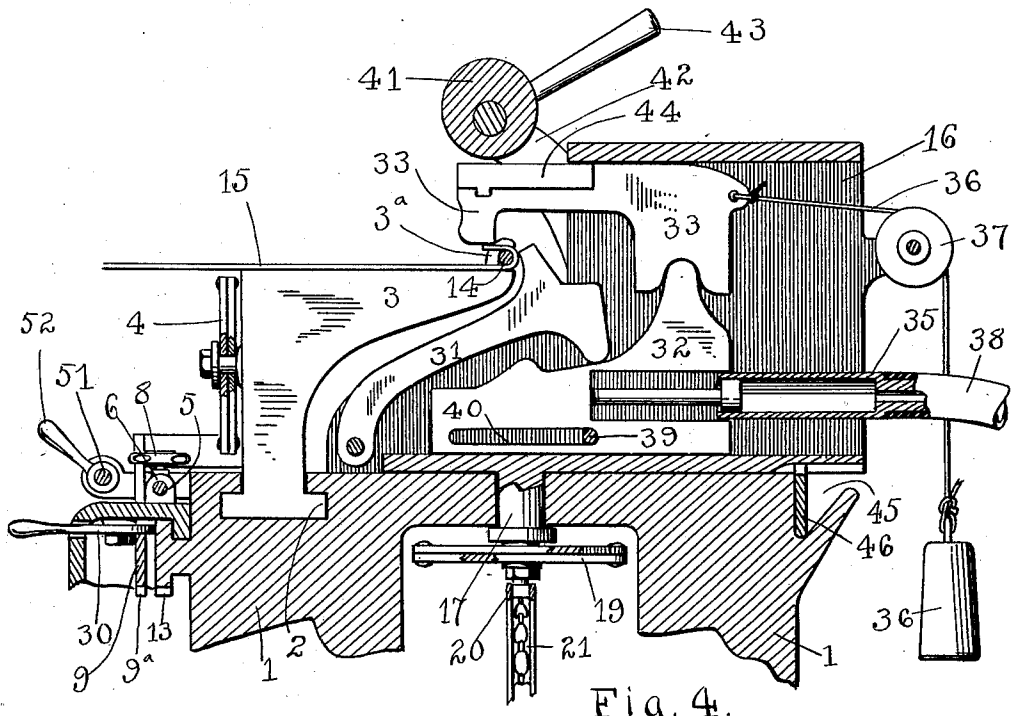


Fig. 4.

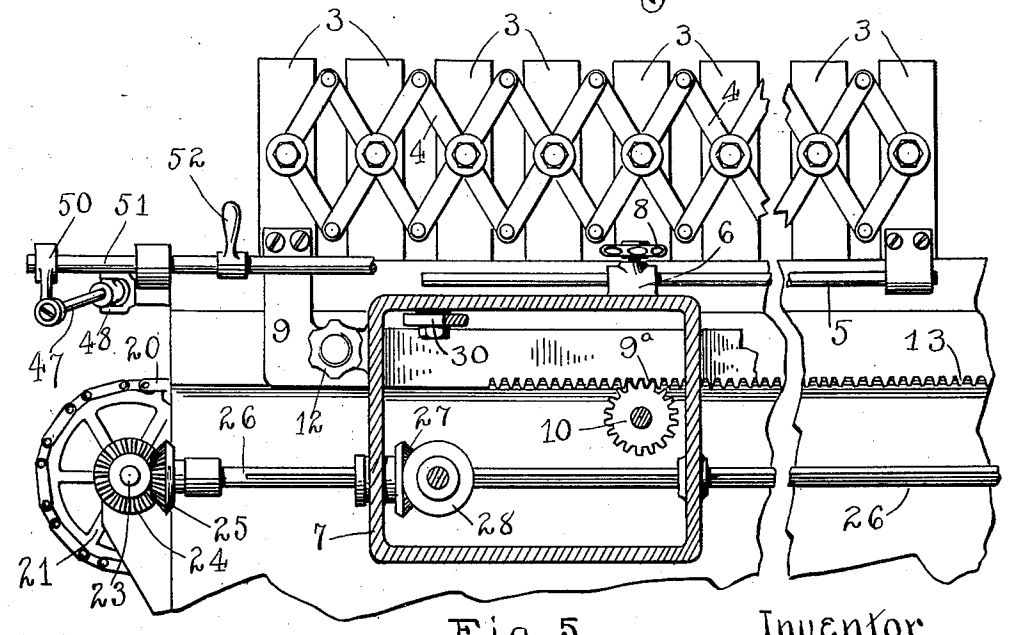


Fig. 5.

Witnesses

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4 SHEETS—SHEET 4.

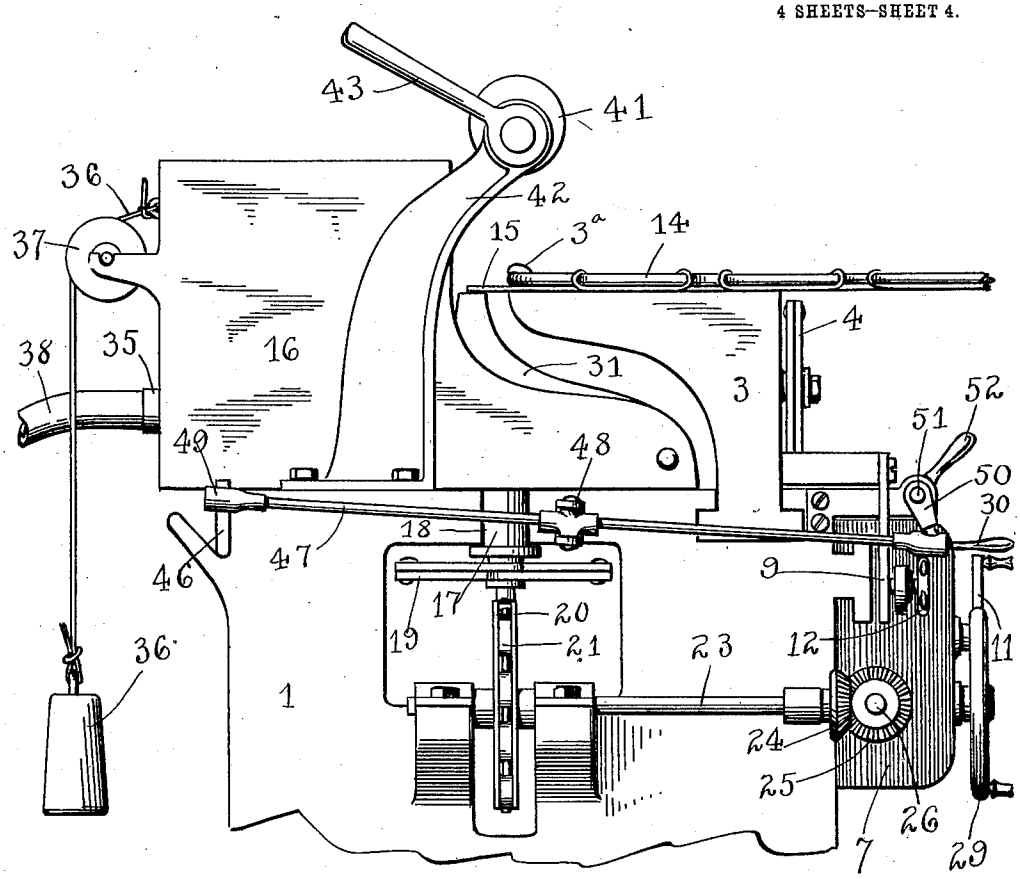


Fig. 6.

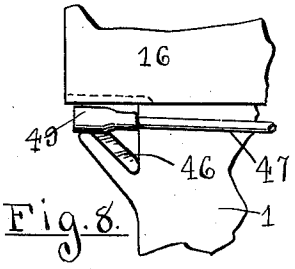


Fig. 8.

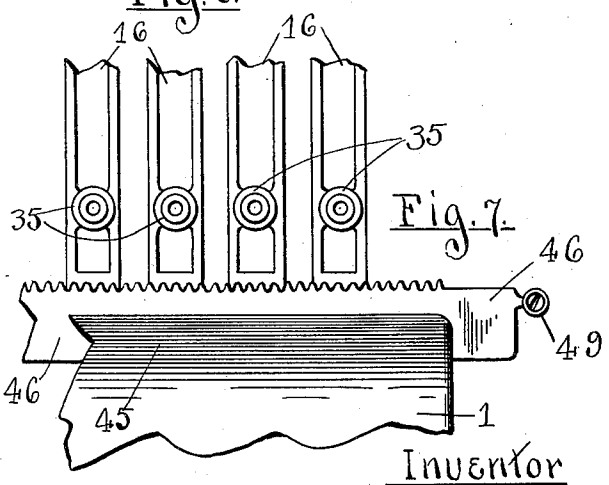


Fig. 7.

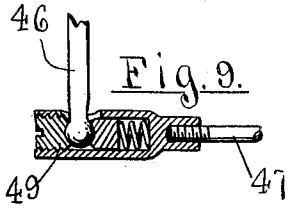


Fig. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

HENRY L. CRAVEN, OF GRAND RAPIDS, MICHIGAN.

WIRE-WORKING MACHINE.

1,085,594. Specification of Letters Patent. Patented Feb. 3, 1914.

Application filed December 9, 1912. Serial No. 735,716.

To all whom it may concern:

Be it known that I, HENRY L. CRAVEN, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Wire-Working 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.

My invention relates to improvements in wire working machines, and more particularly to that class of wire working machines adapted to fold a woven wire mesh over a frame to attach it thereto; and its object is to provide a device adapted to accommodate and operate upon woven wire of different sized mesh and also that which has the strands running at different angles, to provide a device which may be operated and controlled by one person which will be accurate and rapid in operation, and to provide the device with various other new and useful features as hereinafter more fully described and particularly pointed out in the claims.

Heretofore the operation of attaching woven wire to the frame or border wire for window guards, screens, trellises and other analogous structures has been accomplished by hand, which was unsatisfactory in that the operation was exceedingly slow and not always accurate; and, furthermore, that the amount of hand work added to the expense of the product. The wire mesh used in this particular line of work is of a coarse weave and generally of what is known as the "diamond mesh" class; that is, the strands are woven diagonally of the piece and are not always laid at the same angle, and the wire arranged in different sizes of mesh so that the machine which operates upon it must have a universal adjustment.

My newly invented wire working machine is intended to operate successfully under all these conditions, and comprises a frame upon which are slidably mounted a series of table units which carry the work to be operated upon, and which are so connected together that they are at all times evenly spaced apart and are arranged to be quickly and easily adjusted for different sizes of mesh. A corresponding number of forming units are also slidably mounted on the frame and are also adapted to be angularly arranged with reference to the table units and spaced apart the same so that they will aline with the respective strands of wire on which they are each to operate. These forming units are also provided with means whereby they are thus uniformly spaced apart and easily and quickly adjusted. Each forming unit contains a certain mechanism which is adapted to automatically fold one strand of wire over the border wire and attach it thereto, and this mechanism is operated preferably by a pneumatic plunger, the pressure for which is obtained through a flexible tubing which leads from a common header so that all the units of the machine may be operated in unison and perform their operations simultaneously.

The device is also provided with various means which facilitate its operation and add to the convenience and speed of adjustment, and with various other new and useful features of construction and arrangement as will more fully appear by reference to the accompanying drawings; in which,

Figure 1 is a plan view of a device embodying my invention; Fig. 2 is a longitudinal sectional elevation of the same on the line 2—2 of Fig. 3; Fig. 3 is an enlarged transverse section of the device cutting through one of the forming units and showing this unit in inoperative position; Fig. 4 shows the same after the forming unit has performed a part of its operation; Fig. 5 is a front elevation of one end of the machine with parts broken away; Fig. 6 is an enlarged end view of the machine; Fig. 7 is a rear view of a portion of the machine showing the means for adjusting the angle of the forming units; Fig. 8 is a detail showing the adjusting bar in inoperative position; Fig. 9 is an enlarged detail of the universal connection between the adjusting bar and operating lever; and Fig. 10 is an enlarged section on the line 10—10 of Fig. 3.

Like numbers refer to like parts in all of the figures.

1 represents the frame of the machine and is provided in its upper surface and near its forward edge with a longitudinal T slot 2 to receive the T shaped base members of the table units 3. These table units extend upward above the frame and have flat horizontal upper surfaces upon which the material to be operated upon is laid and supported during the operation. The table units are adapted to traverse the T slot 2 so that their spacing may be varied to accommodate

different sizes of material, and in order to conveniently and accurately adjust these units so that their spacing may be uniform at all times, a series of crossed and pivoted bars 4, forming a lazy-tongs construction, is attached to the front vertical surfaces of the said units. A rod 5 is attached to one of the end units and extends longitudinally along the front edge of the machine, passing through a boss 6 on an operating apron 7, which apron is slidably mounted on the front face of the frame. A clamping screw 8 in the boss 6 may be tightened against the rod 5 to hold the end table unit in fixed relation to the apron 7. A rack bar 9 is attached to the opposite end table unit and extends longitudinally of the front surface of the frame, passing through the apron 7 and being provided on its lower edge with rack-teeth 9^a which mesh with a pinion 10 within the apron. The pinion 10 is provided with a crank 11 by which it may be manually rotated to move the rack bar 9 and when the clamping screw 8 is fixed against the rod 5, this movement of the bar 9 will change the spacing between the two end table units, and the intermediate units will automatically be equally spaced apart by virtue of the lazy-tongs connection 4. When the units have been properly spaced a set screw 12 on the apron may be turned down against the bar 9, which will prevent any further movement thereof; and the pinion 10, which is slidably mounted in the apron 7, may be moved inward disengaging it from the rack bar 9 and engaging it with a series of rack teeth 13 on the frame. Rotation of the pinion 10, while in this position, will cause the apron together with the table units which are clamped thereto to traverse the frame so that they will be moved to the desired location. Each table unit is provided on its upper surface near its inner point with a retaining hook 3^a which engages the border wire 14 during the operation of the machine to hold the same in place.

The forming units, each of which operates upon one strand 15 of the wire mesh to fold the same over the border wire, each comprises a casing 16 in which is located the mechanism which performs the operation of folding the wire. Each casing 16 is provided on its lower surface with a stud 17 which passes through a longitudinal slot 18 in the upper surface of the frame. A lazy-tongs arrangement of crossed levers 19 is attached to the lower end of these studs 17 to maintain a uniform spacing of the forming units. One of the end forming units is pivotally attached to the frame of the machine and the opposite end unit is attached by its stud 17 to an endless chain 20 which extends horizontally beneath the studs passing over the sprocket wheels 21 and 22. The sprocket wheel 21 is mounted on a shaft 23 which extends across the end of the frame and is provided at its forward end with a bevel gear 24 which meshes with the bevel gear 25 on a shaft 26. The shaft 26 is journaled on the forward surface of the frame and extends longitudinally thereof, passing through the operating apron 7 and a bevel gear 27 within the said apron is splined on the shaft and meshes with a bevel gear 28 which is provided with a hand wheel 29 on the outside of the apron by which it may be rotated. By this arrangement the operating apron 7 may be placed at any convenient position on the front of the frame of the machine, and by rotating the hand wheel 29 the shaft 26 will be rotated through the gears 27 and 28, which will in turn rotate the shaft 23 and sprocket wheel 21 and move the chain 20 to adjust the spacing of the forming units. The apron 7 may be clamped at any desired location by means of an eccentric clamp 30 which is pivoted in the apron and arranged to engage the frame of the machine by rotating the clamp by means of the hand lever attached thereto.

The mechanism within the forming units, which operates upon the end of each wire strand 15 to fold it over the border wire 14, comprises a pivoted finger 31, a cam block 32, a hammer 33, a piston 34 and a cylinder 35. The finger 31 is pivoted in the casing 16 at one end and has its opposite end supported upon the surface of the cam block 32 and normally lies below the plane of the strand wire 15. The hammer 33 is pivotally mounted on an extension 32^a on the cam block 32 and is normally held against the top of the casing 16 by means of a weight and cord 36, the cord passing over a pulley 37 which is mounted on the rear end of the casing. This weight and cord also serves to return the moving parts of the mechanism to their normal inoperative position. The piston 34 is attached to the cam block 32 and traverses the cylinder 35 which is fixed in the casing 16. A flexible tube 38 is attached to the inlet of the cylinder and serves as a conductor for the motive force which may be either steam, compressed air, or other suitable fluid under pressure. This tube 38 leads to a common header or supply pipe (not shown) which also supplies the tubes for each of the other forming units. A pin 39 fixed in the casing extends through a slot 40 in the cam block and serves to retain the cam block in its operative position, and also acts as a stop pin to limit both the forward and backward movement of the cam block.

The wire mesh together with the border wire is laid upon the table units so that each mesh wire will lie directly over one of the pivoted fingers in the forming units. The upper surfaces of these fingers which engage the wire are crotch-shaped to insure the wire being caught by them. As pressure is applied to the piston 34 the cam block 32

moves forward. The upper surface of the cam block, which supports the free end of the pivoted finger, is irregular in shape, presenting first an upward incline, then a slight depression and another gradual upward incline to the end of the finger which rests upon it. As the cam block moves forward the free end of the finger will rise and engage the end of the strand wire and bend it upward, the finger will then drop into the depression in the surface of the cam block and allow the hammer, which is being carried forward by the cam block, to pass over it and engage the upturned end of the strand wire and bend it over the border wire to a horizontal position. After the downwardly extending portion of the hammer has passed over the finger it rises again on the surface of the cam block till it engages the strand wire, which has now been bent over the border wire, to hold it in place until the operation is completed. The cam block together with the hammer have now reached the end of their stroke and have been stopped by the pin 39 in the slot 40. There now remains the operation of bending the end of the strand wire downward to complete the fold about the border wire and this is accomplished by rotating the eccentric roller 41 which is journaled in standards 42 and provided with a handlever 43 by which it may be manually actuated. This eccentric roller extends longitudinally over the machine and when the forming hammers are in their forward position their forward ends lie directly beneath the eccentric roller so that when it is rotated it engages and depresses the hammers which are pivotally connected to the cam block causing them to bend the ends of the strand wire downward over the border wire to complete the operation.

In depressing the hammers the cam roller engages the hardened blocks 44 which are detachably located on the upper surfaces of the hammers and should it be necessary, owing to the peculiar shape or size of the material to be operated upon, to locate the said material so that the border wire should at some point lie directly beneath the hammer of one of the forming units, the hardened block 44 on this hammer may be removed to prevent its operation so that it will not be broken by being brought into contact with the border wire.

After the operation of forming the wire has been completed the pressure is released from behind the piston 34 and the moving parts are returned to their normal position by means of the weight and cord 36. In order that these forming units may operate successfully it is necessary that they be in alinement with the wires on which they operate, and in order to adjust them in this alinement, which varies with different pieces of material, the following mechanism is provided: A trough 45 is provided at the rear edge of the frame near the upper corner thereof, and a bar 46 is slidably located therein. The said bar has a serrated upper edge and the lower surfaces of the casings 16 near their rear edges, which overhang the trough 45, are provided with like serrations and when the bar is in vertical position its serrated upper edge will engage the serrations in the lower surfaces of the casings and any longitudinal movement of the bar will carry the rear ends of the casings with it causing them to rotate about the pivot studs 17, thus changing their angle. The movement of this bar in either direction is limited and it is sometimes necessary to shift the units farther than one movement of the bar will permit, and in this event the bar is tipped backward until it is disengaged from the lower surfaces of the casings and moved longitudinally in this disengaged position and then raised again to obtain a new grip upon the casings to shift them farther to the desired position. Means whereby this bar may be conveniently operated from the front of the machine is provided, comprising a lever 47 which is pivoted to the end of the frame of the machine in the yoke 48 and is also slidable in this yoke. This lever is connected by a ball and socket joint 49 to the end of the bar 46 and its other end is connected by a similar ball and socket joint to a lever 50 on the end of a rock shaft 51. This rock shaft extends longitudinally across the front of the frame of the machine, and is also longitudinally slidable and provided at intervals with handles 52 by which it may be operated. By this construction the operator is enabled to both tip the bar 46 out of or into engagement with the lower surfaces of the casings, and also to longitudinally slide the same, a rotative movement of the shaft 51 serving to move the lever 47 longitudinally to tip the bar 46, and a sliding movement of the shaft 51 transmits the same movement to the lever 47 to move the bar 46 longitudinally.

The operation of the machine is as follows: The piece of wire mesh which is to be folded over a border wire to form a window guard or like construction is first laid upon the table units so that the ends of the strands over-lap the edge of the units sufficiently to allow them to be folded over the border wire, the table units having been first adjusted so that the retaining hooks 3^a thereon will lie within the meshes of the material, this adjusting being accomplished by first tightening the set screw 8 upon the rod 5 and then rotating the pinions 10 in mesh with the rack bar 9 as before described. The border wire over which the wire mesh is to be folded is then laid upon the wire mesh so that it is engaged by the retaining hooks 3^a and held

thereby in its proper position. The forming units are then adjusted to their proper spacing so that each unit will be adjacent to the respective wire strand upon which it is to operate, this adjustment being performed by rotating the hand wheel 29 which transmits its movement through the shafts 26 and 23 and intermediate beveled gears to the sprocket 21 and chain 20 as before described. The angle of the forming units is then adjusted by means of the adjusting bar 46 and operating lever 47 and rock shaft 51 so that each unit will properly aline with the strand wire upon which it is to operate. It will be noticed that the pivot studs 17 about which the units turn are located directly beneath the ends of the wire to be operated upon so that any change in the angle of the forming units will not change the relative positions of wire and pivoted finger. This adjustment being made the machine is in readiness for operation and a valve of any convenient type in the supply pipe or header (not shown) is opened to admit the pressure to the supply tubes 38 and into the cylinders 35 to the pistons 34. This causes the cam blocks in each of the forming units to move forward simultaneously carrying upward the pivoted fingers 31, bending the end of the strand wires upward and then allowing the fingers to drop below the level of the hammers 33 which advance and catch the upwardly extending ends of the strand wires and carry them forward. The cam roller 41 is then rotated by means of the hand lever 43 which engages the hardened blocks 44 on the upper surfaces of the said hammers and carries them downward to complete the fold in the strand wire. The pressure is then released from behind the pistons 34 and the weights 36 return the moving parts to their inoperative position.

What I claim is:

1. A wire working machine, comprising a frame, a series of table units adjustably mounted on the frame to support the work, a series of wire forming units mounted on the frame and adjustable relative to the work, and means for actuating the mechanism carried by the forming units.

2. A wire working machine, comprising a frame, a series of table units adjustably mounted upon the frame to support the work, means for maintaining a uniform spacing of the table units, a series of wire forming units mounted on the frame and adjustable relative to the work, and means for actuating the mechanism of the forming units.

3. A wire working machine, comprising a frame, a series of table units adjustably mounted upon the frame, means for adjusting the table units, a series of wire forming units adjustably mounted upon the frame adjacent to the table units, and means for actuating the mechanism of the forming units.

4. A wire working machine, comprising a frame, a series of table units adjustably mounted upon the frame, means for maintaining a uniform spacing between the table units, means for adjusting the spacing of the table units, a series of wire forming units adjustably mounted upon the frame adjacent to the table units, and means for simultaneously operating the mechanism of the wire forming units.

5. A wire working machine, comprising a frame having a table member, a series of wire forming units adjustably mounted upon the frame adjacent to the table member, means for maintaining a uniform spacing between the forming units, and means for actuating the mechanism of the forming units.

6. A wire working machine, comprising a frame having a table member, a series of wire forming units adjustably mounted upon the frame adjacent to the table member, means for simultaneously adjusting the wire forming units, and means for actuating the mechanism of the forming units.

7. A wire working machine, comprising a frame having a table member, a series of wire forming units adjustably mounted upon the frame adjacent to the table member, means for maintaining a uniform spacing between the wire forming units, means for simultaneously adjusting the spacing of the forming units, and means for actuating the mechanism of the forming units.

8. A wire working machine, comprising a frame, a series of table units adjustably mounted upon the frame, means for maintaining a uniform spacing between the table units, means for simultaneously adjusting the spacing of the table units, a series of wire forming units adjustably mounted upon the frame adjacent to the table units, means for maintaining a uniform spacing between the forming units, means for simultaneously adjusting the spacing of the forming units, and means for actuating the mechanism of the forming units.

9. A wire working machine, comprising a frame, a series of table units longitudinally slidable on the frame, a series of crossed levers pivoted to each other and to the table units to maintain a uniform spacing between the same, means for adjusting the spacing between the table units, a series of wire forming units mounted upon the frame adjacent to the table units, and means for simultaneously actuating the mechanism of the forming units.

10. A wire working machine, comprising a frame, a series of table units longitudinally adjustable upon the frame, means for maintaining a uniform spacing between the same, an apron longitudinally slidable upon

the frame, means for clamping one of the end table units to the apron, a rack bar attached to the opposite end table unit and extending longitudinally across the frame and through the apron, a pinion journaled in the apron and meshing with the teeth in the rack bar and provided with a crank, a series of wire forming units adjustably mounted upon the frame adjacent to the table units, and means for actuating the mechanism of the forming units.

11. A wire working machine, comprising a frame, a series of table units longitudinally adjustable upon the frame, a lazy-tongs attached to the table units to uniformly space the same, an apron longitudinally slidable upon the frame, a rod attached to one end table unit extending longitudinally across the frame and adapted to be clamped to the apron, a rack-bar attached to the opposite end table unit extending longitudinally across the frame and passing through the apron, a pinion journaled in the apron and meshing with the teeth in the rack bar and provided with a crank, a series of wire-forming units adjustably mounted upon the frame adjacent to the table units, and means for actuating the mechanism of the forming units.

12. A wire working machine, comprising a frame, a series of table units longitudinally slidable upon the frame, a lazy-tongs attached to each of the table units to maintain a uniform spacing between the same, an apron longitudinally slidable upon the frame, a rack bar attached to one of the end table units and extending longitudinally across the frame and through the apron, rack teeth on the frame adjacent to and parallel with the teeth in the rack bar, a pinion journaled in the apron and axially slidable and adapted in one position to mesh with the teeth in the rack bar and in the other position to mesh with the teeth in the frame, a clamp on the apron to clamp it rigidly to the frame, a clamping screw on the apron to engage the rack bar, a rod attached to the other end table unit, said rod extending longitudinally across the frame and adapted to be clamped to the apron, a series of wire forming units mounted on the frame and adjustable relative to the work, and means for operating the mechanism of said forming units.

13. A wire working machine, comprising a frame having a table member, a series of wire forming units supported on the upper surface of the frame adjacent to the table member, a stud projecting downward from each forming unit, a lazy-tongs attached to said studs to maintain a uniform spacing between the said forming units, means for simultaneously adjusting the spacing between the forming units, and means for actuating the mechanism of the forming units.

14. A wire working machine, comprising a frame having a table member, a series of wire forming units supported upon the surface of the frame adjacent to the table member, a stud projecting downward from each of the forming units, the stud on one of the end forming units being pivoted in the frame and the studs on the rest of the forming units passing through a longitudinal slot in the upper surface thereof, means for maintaining a uniform spacing between the forming units, an endless chain extending longitudinally beneath the studs and passing over sprocket wheels, a connection between the endless chain and the stud on the end forming unit opposite the one which is pivoted to the frame, means for moving the endless chain to adjust the spacing between the forming units, and means for actuating the mechanism of the forming units.

15. A wire working machine, comprising a frame having a table member, a series of wire forming units supported upon the upper surface of the frame adjacent to the table member, a stud extending downward from each wire forming unit, the stud on the forming unit at one end of the series being pivoted to the frame and the rest of the studs passing through a longitudinal slot in the upper surface thereof, means for maintaining a uniform spacing between the forming units, an endless chain extending longitudinally beneath the studs and passing over sprocket wheels journaled on the frame, a connection between the chain and the stud on the unit at the other end of the series, an apron longitudinally slidable upon the frame, a shaft journaled on the frame extending longitudinally thereof and passing through the apron, a bevel gear splined to the shaft and journaled in the apron, a bevel gear meshing with said splined gear journaled in the apron and provided with a hand wheel, a bevel gear connection between the splined shaft and the axle of one of the sprocket wheels, and means for actuating the mechanism of the forming units.

16. A wire working machine, comprising a frame having a table member, a series of wire forming units supported upon the upper surface of the frame adjacent to the table member, a stud extending downward from each wire forming unit, the stud on the unit at one end of the series, being pivoted to the frame and the rest of the studs passing through a slot in the frame, means for maintaining a uniform spacing between the forming units, an endless chain extending beneath the studs and engaging sprocket wheels journaled on the frame, a connection between the chain and the stud on the forming unit at the other end of the series, an apron slidable upon the frame, a shaft journaled on the frame extending longitudinally thereof and passing through the apron, a

bevel gear splined on the shaft and journaled in the apron, a bevel gear meshing with said splined gear journaled in the apron and provided with a hand wheel, a bevel gear connection between the splined shaft and the axle of one of the sprocket wheels, means for angularly adjusting the forming units relative to the table member, and means for actuating the mechanism of the forming units.

17. A wire working machine, comprising a frame having a series of table members, a series of wire forming units pivotally mounted on the frame adjacent to the respective table units, said forming units overlapping the edge of the frame at their rear ends, serrations in the forming units, a trough extending longitudinally of the frame beneath the ends of the forming units, a bar supported in the trough and longitudinally slidable therein, said bar having serrations in its edge to correspond with and engage the serrations in the forming units when the bar is in vertical position, and adapted to disengage from the same when the bar is tipped downward, means for tipping the bar into or out of engagement with the forming units, means for moving the bar longitudinally, and means for actuating the mechanism of the forming units.

18. A wire working machine, comprising a frame having a series of table units, a series of wire forming units adjustably mounted on the frame adjacent to the respective table units, said forming units overlapping the edge of the frame at their rear ends, serrations in the under surfaces of the said rear ends, a trough extending longitudinally of the frame beneath the said ends of the forming units, a bar supported in the trough and longitudinally slidable therein, said bar having serrations in its upper edge to correspond with and engage the serrations in the under surfaces of the forming units when the bar is in vertical position, and adapted to disengage from the forming units when the bar is tipped downward, means for tipping the bar into or out of engagement with the forming units, means for moving the bar longitudinally, means for adjusting the forming units at regular intervals, and means for actuating the mechanism of the forming units.

19. A wire working machine, comprising a frame having a table member, a series of wire-forming units pivotally mounted on the frame adjacent to the table member, said forming units over-lapping the edge of the frame, serrations in the under surfaces of the forming units where they over-lap the frame, a trough extending longitudinally of the frame beneath the over-lapping ends of the forming units, a bar longitudinally slidable in the trough and having serrations in its upper edge to engage the serrations in the forming units when the bar is in vertical position, and to disengage therefrom when the bar is tipped downward, a lever extending transversely across one end of the frame and having a universal connection at one end to the said bar, said lever being mounted intermediate its ends in a pivoted yoke and having a longitudinal movement in the said yoke, a rock shaft journaled in the frame and extending across the front thereof, said rock shaft having a longitudinal movement in its bearings, handles located at intervals upon the rock shaft, an arm on one end of the rock shaft having a universal connection to the other end of the lever, and means for actuating the mechanism of the wire forming units.

20. A wire working machine, comprising a frame having a series of table members, a series of wire-forming units adjustably mounted on the frame adjacent to the respective table members, said forming units over-lapping the rear edge of the frame, serrations in the under surfaces of the forming units where they over-lap the frame, a trough extending longitudinally of the frame beneath the over-lapping ends of the forming units, a bar longitudinally slidable in the trough and having serrations in its upper edge to engage the serrations in the forming units and adapted to mesh therewith when the bar is in vertical position, and to disengage therefrom when the bar is tipped downward, a lever extending transversely across one end of the frame and having a universal connection with the serrated bar, said lever being mounted intermediate its ends in a pivoted yoke and having a longitudinal movement in the said yoke, a rock shaft journaled in the frame and extending longitudinally across the front thereof, said rock shaft having a longitudinal movement in its bearings, handles located at intervals upon the rock shaft, an arm on one end of the rock shaft having a universal connection to the other end of the lever, means for adjusting the forming units at regular intervals, and means for actuating the mechanism of the forming units.

21. A wire working machine, comprising a frame having a table member to support a wire, a finger pivoted at one end and adapted to engage the end of the wire to bend the same, a slidable cam block having an irregular upper surface engaging the free end of the pivoted finger to move the same as the cam block slides, a hammer pivotally connected at its rear end to the cam block and adapted to engage the upturned end of the wire to further bend the same, means for yieldably holding the hammer in normal position, means for depressing the hammer when it is at the forward limit of its stroke, and means for reciprocating the cam block.

22. A wire working machine, comprising

a frame having a table to support a wire, a casing located adjacent to the table portion, a cam block slidable in the casing and having an irregular upper surface, a finger pivoted at one end to the casing and having its other end supported upon the said surface and adapted to engage the over-hanging end of the wire to bend it upward, a hammer pivotally connected at its rear end to the cam block and having its other end yieldably held in engagement with the upper side of the casing and adapted when moved forward to engage the upturned end of the work and bend it to a horizontal position, means for yieldably holding the forward end of the hammer in engagement with the upper side of the casing, an eccentric roller adapted to engage the forward end of the hammer to depress the same, means for rotating the eccentric roller, and means for reciprocating the slidable cam block.

23. A wire working machine, comprising a frame having a table member to support the wire, a retaining hook on the table to engage another wire to hold the same in position, a casing adjacent to the table member, a slidable cam block within the casing having an irregular upper surface, a finger pivoted at one end to the casing and having its other end supported upon the irregular surface of the cam block whereby the free end of the finger is caused to move vertically to engage the over-hanging end of the work and bend it upward as the cam block slides beneath the finger, an upward extension at the rear end of the cam block, a hammer pivoted at one end to the upward extension on the cam block and having its other end held yieldably in engagement with the upper side of the casing and adapted as it moves forward with the cam block to engage the upturned end of the first named wire and bend the same, means for yieldably holding the forward end of the hammer in engagement with the upper side of the casing, a detachable block on the upper surface of the forward end of the hammer, an eccentric roller adapted when rotated to engage the detachable block to depress the forward end of the hammer, and means for reciprocating the slidable cam block.

24. A wire working machine, comprising a frame having a table member to support a wire, a casing adjacent to the table member, a cam block slidable within the casing and having an irregular upper surface, a finger pivoted at one end to the casing and having its opposite end supported upon the irregular surface of the cam block and traversed by the same as the cam block is reciprocated whereby the free end of the finger is given a vertical movement to engage the over-hanging end of the wire to bend the same upward, a pin fixed in the casing and extending through a slot in the cam block to limit the movement of the same, a cylinder fixed in the casing, a piston within the cylinder and attached to the cam block, means for admitting pressure to the cylinder, a hammer pivotally connected at its rear end to the cam block and having its forward end yieldably held in engagement with the upper side of the casing and adapted to engage the upturned end of the work as it moves forward, means for depressing the forward end of the hammer when it is at the forward limit of its stroke, a pulley journaled in the rear end of the frame, a cord passing over the pulley and having one end attached to the rear end of the hammer above its pivoted connection with the cam block and having a weight suspended from its other end whereby the forward end of the hammer is held yieldably against the upper side of the casing, and the cam block and hammer are returned to the rear of the casing when the pressure in the cylinder is released.

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

HENRY L. CRAVEN.

Witnesses:
HAROLD O. VAN ANTWERP,
MAE RANKIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."