To all whom it may concern: 

Be it known that I, WILLIAM M. BRITTON, a citizen of the United States of America, of Syracuse, in the county of Onondaga, in the State of New York, have invented and useful Improvements in Methods of and Apparatus for Making Cotter Pins, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to a method of and apparatus for making cotter pins of the split type having a head at one end and a stud at the other end, and to the method of establishing a twisted and offset relation between the head and shank so that the head is elongated in the plane of the split.

The main object is to effect these relations in a simple, economical and efficient manner in practically one operation.

These pins are usually made of strips of half-round wire bent or folded substantially midway between their ends around a suitably supporting form with their flat faces in juxtaposed relation, and one of the specific objects of my present invention is to turn the head a quarter turn, relatively to the shank immediately following the folding operation, and while the pin is still supported upon the form and held between the pinching dies.

Another object is to withdraw the supporting form immediately following the turning or twisting operation and withdrawal of the pinching dies for releasing the finished cotter pin and allowing it to drop into a suitable receptacle thus leaving the machine ready for a repetition of the bending and twisting ceeding operations upon such a frame a 1- having a horizontal guide 2- along which the wire is fed endwise by hand or any other suitable means against a suitable stop 3- on the frame. The frame is provided with a relatively fixed hardened shearing edge 4- adjacent the guide 2- a distance from the stop 3- corresponding to the length of wire required to form the cotter pin for cooperation with a vertically movable knife or cutter 5- carried by a plunger 6- which is reciprocally movable in a suitable guide 7- in the frame 1-.

An upright sleeve 8- is journaled in the upper portion of the frame 1- for rotary movement directly over the guide 2- substantially midway between the stop 3- and cooperative shearing members 4- and 5- and carries at its lower end, a horiz-
tally movable wire supporting form —9— which is preferably cylindrical and around which the intermediate portion of the wire strip —a— is adapted to be folded or bent in a manner hereinafter described, said pin being movable endwise in a guide opening —g— at one side of the axis of the sleeve —8— a distance corresponding, approximately to the thickness of the wire strips —a— to permit the formation of the head of the cotter pin mainly at one side of the axis of its shank and also to allow the head of the cotter pin to be twisted about the axis of the shank as will be hereinafter more fully described.

The wire —a— with its flat side at the bottom is fed endwise forward along the guide —g— and across the upper face of the form —9— until its forward end engages the stop —3— whereupon the shearing plunger —6— is depressed to cause its knife —5— to cooperate with the shearing member —4— for severing the strip which is to form the cotter pin from the main body of the wire, after which the ends of the severed strip are pressed down wardly around the form —9— to form the head and opposite legs of the shank of the cotter pin.

The means for bending the ends of the wire strip around the form —9— consists of a die —10— secured to the lower end of a vertically movable plunger —11— which is guided in an opening —12— in the sleeve —8— with its axis passing through the axis of the wire-supporting form —9— and therefore, eccentric to the axis of the sleeve —8—, a distance corresponding approximately to the thickness of the wire.

The die —10— is provided in its lower face, with a substantially semi-circular recess —13— having its axis in the vertical plane of the axis of the wire-supporting form —9— and its radius substantially equal to the combined radii of the wire-supporting form and wire so that when the plunger —11— with the die —10— thereon is depressed, the walls of the recess —13— will engage and depress the ends of the wire strip around opposite sides of the form —9— thereby forming an eye in the head of the pin.

Immediately following this bending operation of the wire around the form —9— the ends of the wire strip are pressed together beneath and adjacent the pin by a pair of horizontally movable dies —14— and —14'— which are movable in suitable guides —15— in the frame —1— as shown in Figures 1 and 5.

The shearing plunger —6— is adapted to be depressed against the action of a retracting spring —16— by means of a hand lever —17— which is pivoted at one end by a pivotal bolt —18— to one side of the upper end of the sleeve —8— at a point between the plungers —6— and —11— and is provided with a bearing —19— adapted to be brought into engagement with the upper end of the plunger —6— when turned to a position shown by dotted lines in Figure 1, for sev ering the strip as —a— which is to form the cotter pin as the free end of the lever is rocked downwardly against the action of the retracting spring —16—.

This same lever —17— is also used for de pressing the plunger —11— against the ac tion of a retracting spring —20— and for this purpose, the edge of the lever opposite the bearing —19— is provided with an additional bearing —21— engaging in a dia metrical slot —22— in the upper end of the plunger and adapted to rest against a hardened bearing —23— whereby when the lever is rocked across the upper end of the plunger and depressed to the position shown by dot ted lines at the right of Figure 1, the plunger —11— and its die —10— will be depressed to bend the wire strip —a— around the supporting form —9— or to the position shown by dotted lines in the same figure, it being understood that when pressure upon the lever for operating either the plungers —6— or —11— is released, the lever and plungers will be returned by their respective springs —16— and —20—.

When the wire strip —a— has been bent around the supporting form —9— as just described, and while the plunger —11— is still held in its depressed position, the dies —14— and —14'— are operated to pinch the ends of the wire strip against each other.

The means for operating the dies —14— and —14'— consists in this instance, of a pair of bell crank levers —24— and —24'— pivoted at —25— to the main supporting frame —1— at opposite sides of the plane of movement of the plunger —11—, said le vers having upwardly projecting arms provided with fluted ends adapted to engage suitable pins or bearings —26— on their respective dies —14— and —14'—, the other arms of the levers —24— being extended toward each other and connected by links —27— to a yoke —27— which in turn is pivoted at —25— to an upright rod —29—.

The lower end of this rod is connected to a pedal lever —30— by which the rod —29— may be depressed for operating the dies —14— and —14'— toward each other against the action of retracting springs —31—, Figure 1.

It is desirable to operate the dies —14— and —14'— in such manner that one of the legs of the cotter pin will be left substantially straight or tangential to the adjacent side of the supporting form —9— and to press the other leg of the pin, mainly beyond the vertical plane of the axis of said supporting form so that the two flat faces of the legs are brought together leaving the
head of the pin elongated and offset laterally at right angles to the plane of the split or meeting faces of the legs of the cotter pin, and for this purpose the movement of the die —14— is limited by cooperative stop shoulders —32— and —38— on the die and frame respectively to cause the inner end of the die —14— to stop as soon as it has forced the adjacent leg of the cotter pin to a vertical position, while the swinging movement of the yoke —27— on the rod —29— permits the other die —14— to bend the corresponding leg of the cotter pin slightly beyond the vertical plane of the axis of the supporting form —9— to contact with the opposite leg and thereby to produce the desired offset of the head of the cotter pin.

The central portion of the lower end of the bending die —10— is slotted to receive the supporting form —9— when the plunger —11— is depressed and also to permit the walls of the recess —13— to engage the opposite sides as well as the periphery of the head as —6—, of the cotter pin —3—.

Figures 6 and 7.

As previously stated, the wire-supporting pin —9— is mounted upon the lower end of the sleeve —8—, and normally extends at right angles to the direction of length of the wire strip —a—, but as soon as this strip is bent around the supporting form —9— by the depression of the plunger —11—, the sleeve —8— with the die —10— and plunger —11— are rotated a quarter turn, while the shank of the cotter pin is firmly held against rotation by engagement therewith of the dies —14— and —14'— whereby the portion of the cotter pin at the junction of the head with the shank will be twisted and the wider portion of the head —8— of the cotter pin will be caused to lie in substantially the same plane as the meeting faces of the opposite legs of the pin, it being understood that the axis of rotation of the sleeve —8— is substantially coincident with the axis of the shank of the folded cotter pin and that the offset portion of the head of the shank will be twisted to a plane substantially coincident with the plane of the meeting faces of the legs of the pin.

The means for rotating the sleeve —8— consists of the lever —17— and its bearing —21— engaging in the slot —22— on the upper end of the plunger —11— together with the pivoting of the shorter end of the lever to the upper end of the sleeve —8— so that while the free end of the lever —17— is depressed and the dies —14— and —14'— are in their closed position, a lateral movement of the lever through an arc of substantially 90° will cause a corresponding rotation of the sleeve —8— and bending die —10— to effect a similar twist of the head of the cotter pin relatively to its shank.

This latter operation completes the formation of the cotter pin around the supporting form —9— and immediately following this operation, the wire-supporting form —9— is withdrawn from the cotter pin to allow the latter to drop by its own weight into an underlying receptacle not shown.

For this latter purpose, one end of the form —9— is provided with a radial projection —32— adapted to engage in a notched pawl —32— on the adjacent side of the die —14— when the sleeve —8— with the die —10— and plunger —11— thereon are turned a quarter turn from their normal positions, and while the dies —14— and —14'— are still in their closed positions upon the shank of the cotter pin so that as soon as the pressure upon the pedal —30— is released and the dies are withdrawn by their respective springs —31—, the engagement of the notched pawl —32— with the projection —33— on the form —9— will withdraw said form from the head of the cotter pin and thus permit the latter to drop to the floor or any underlying receptacle.

As the plunger —14— approaches the limit of its outward movement, the pawl —35— is depressed against the action of a retracting spring —34— by engagement with the upper wall of the guide —15— thereby releasing the wire-supporting form —9— and allowing it to be returned to its normal position by a retracting spring —35—.

Immediately following this retracting operation of the supporting form —9— to its normal position, the downward pressure upon the hand lever —17— is released and returned to its normal up position by its retracting spring —20— whereupon it may be turned laterally a quarter turn to its starting position to cause a similar return movement of the sleeve —8—, plunger —11— and die —10— ready for a repetition of the operations previously described.

In other words, following each forward movement of the wire —a— against the stop —8—, the strip which is to form the cotter pin is first cut to the desired length, then bent around the form —9— by the depression of the die —10— and following which the depressed ends of the strip are pressed together to form the shank of the pin by the closing of the dies —14— and —14'—.

The head of the pin is then twisted a quarter turn by the rotation of the die —10— after which the form —9— is withdrawn to allow the finished pin to drop from the machine and the operating parts are then returned to their normal positions ready for a repetition of the operation upon another strip.

I claim:

1. A method of forming split cotter pins,
consisting in bending a strip of wire around a suitable support to form a head and opposite legs, then pressing the legs together to form the shank, and then turning the support about the axis of the shank to twist the head relatively to said shank.

2. A method of forming split cotter pins, consisting in bending a strip of wire around a suitable support to form a head and opposite legs, then pressing the legs together mainly at one side of the axis of the support to form a shank and to offset the head, and then turning the support a quarter turn relatively to the shank for twisting the head at right angles to its bending plane.

3. A method of forming split cotter pins, consisting in bending a strip of wire around a suitable support to form a head and opposite legs, then pressing the legs together to form a shank, and then relatively twisting the head and shank about the axis of said shank to bring the widened portion of the head in a plane parallel with the meeting faces of the legs.

4. An apparatus for making split cotter pins, having in combination, a wire bending mechanism, means for forming the head of the cotter pin, and a twisting mechanism for locating the greater width of the head of the pin in a plane parallel with the plane of the split.

5. In an apparatus for making split cotter pins, means for folding a strip of wire intermediate its ends to form a head at the fold, means for pressing the ends together to form the shank, and means for bringing the widened portion of the head in a plane parallel with the meeting faces of the end.

6. In an apparatus for relatively twisting the head and shank of a split cotter pin, a device for gripping the head, a device for gripping the shank, and means for partially rotating one of said devices relatively to the other device.

7. In an apparatus for making split cotter pins, a supporting form for the cotter pin blank, means for bending the blank around said form to form the head and legs of the pin, means for pressing the legs together, and means for relatively rotating the pressing means and form to effect a relative twist between the head and legs.

In witness whereof I have hereunto set my hand this 6th day of December, 1923.

WILLIAM M. BRITTON.

Witnesses:

H. E. CHASE,
RITA CAMPOLIETO.