S. E. DUNHAM.

WOOD FASTENER MACHINE.

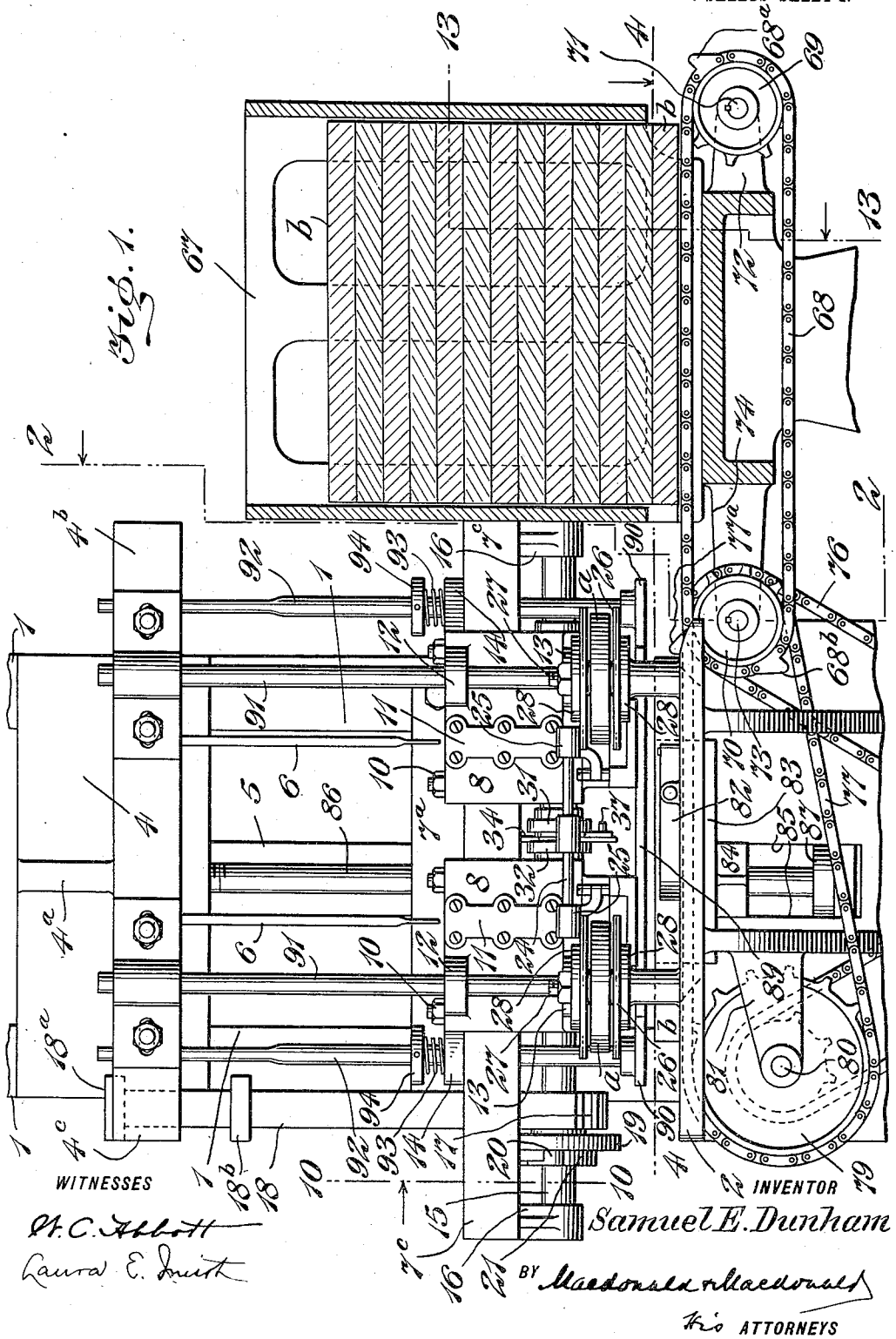
APPLICATION FILED NOV. 13, 1908.

1,068,990.

Patented July 29, 1913.

7 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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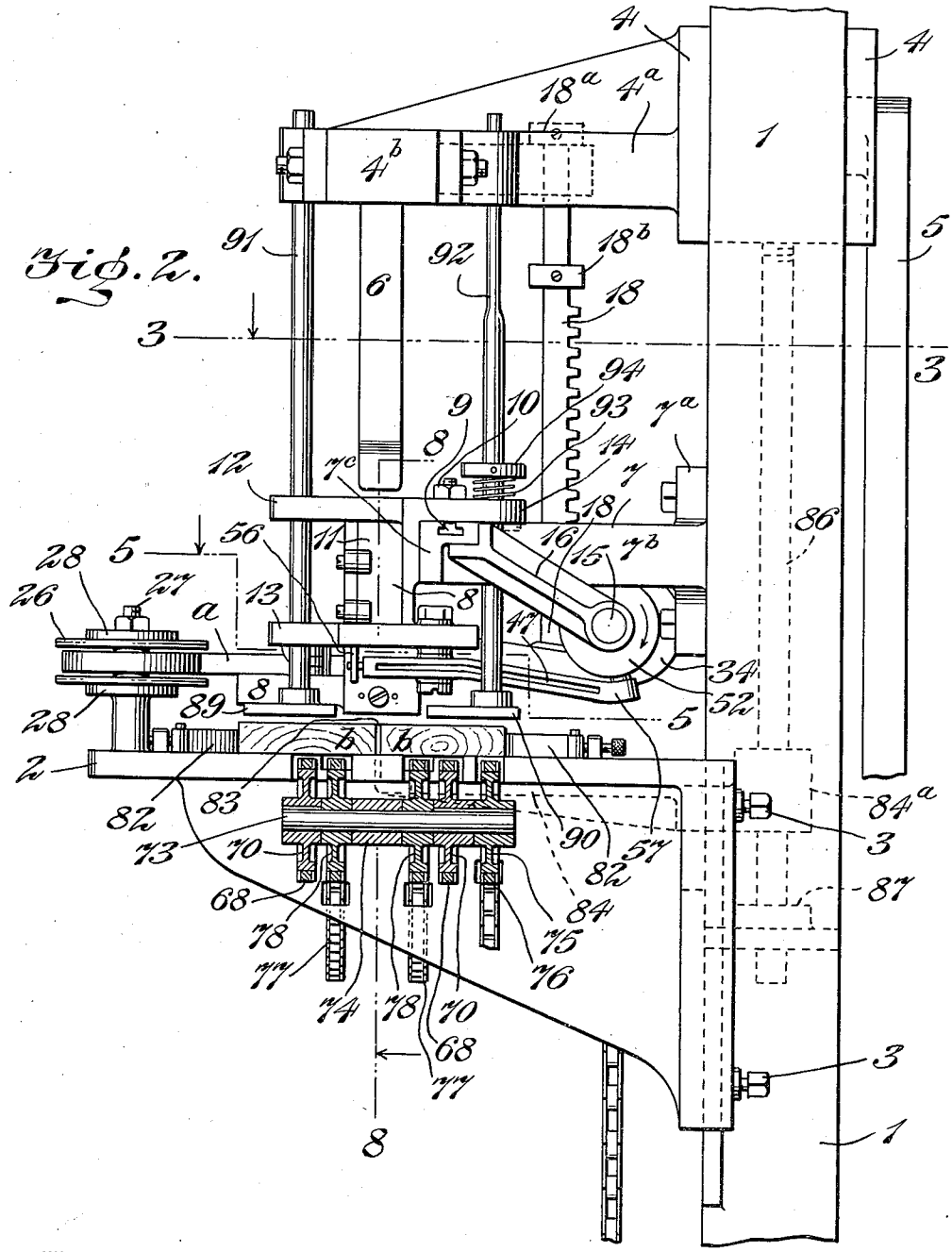
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7 SHEETS—SHEET 2.

Fig. 2.



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Fig. 3.

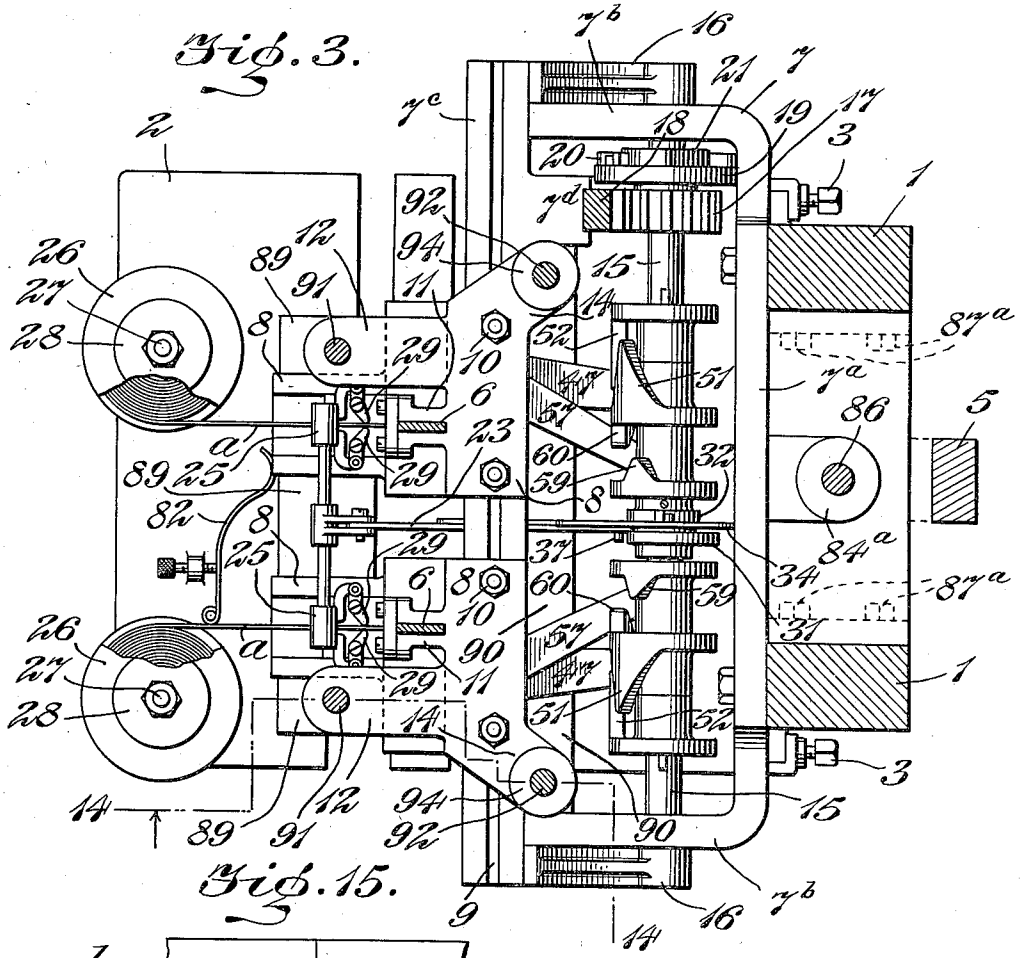


Fig. 15.

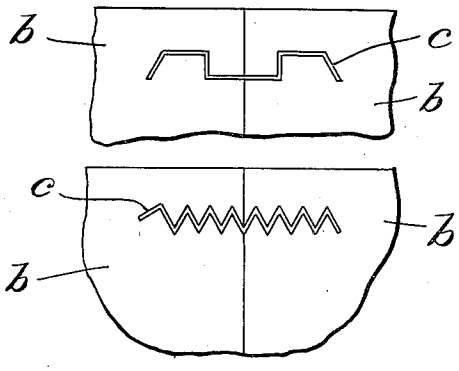


Fig. 16.

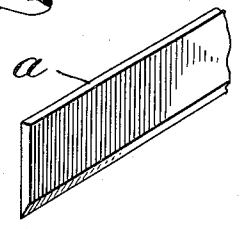


Fig. 17.

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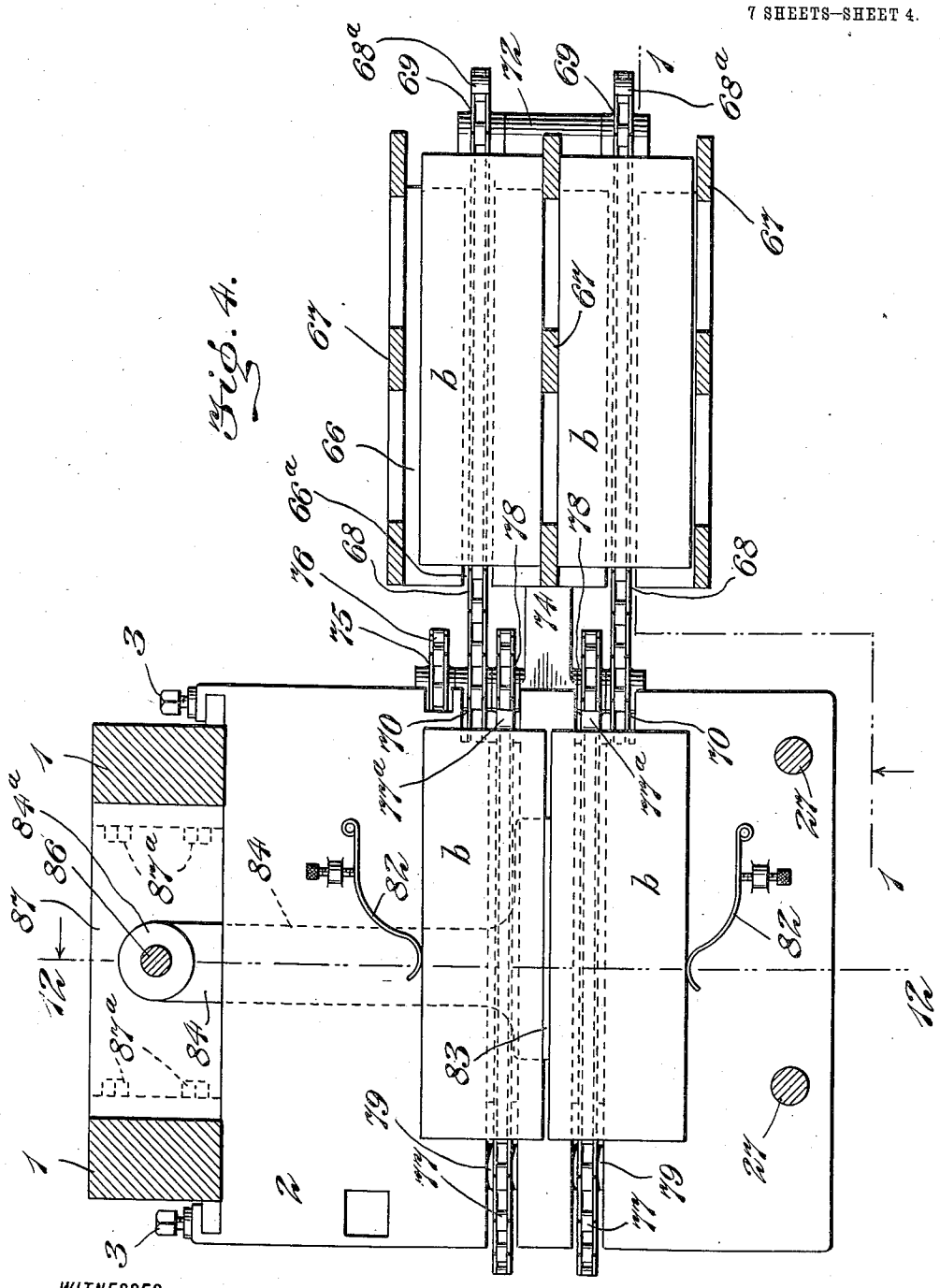
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7 SHEETS—SHEET 4.

Fig. 4.



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7 SHEETS—SHEET 5.

Fig. 6.

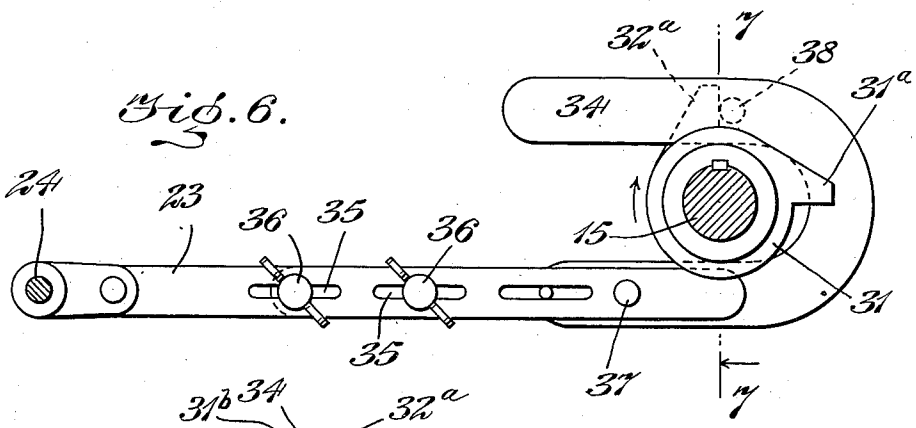


Fig. 7.

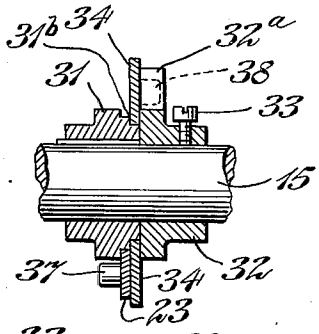
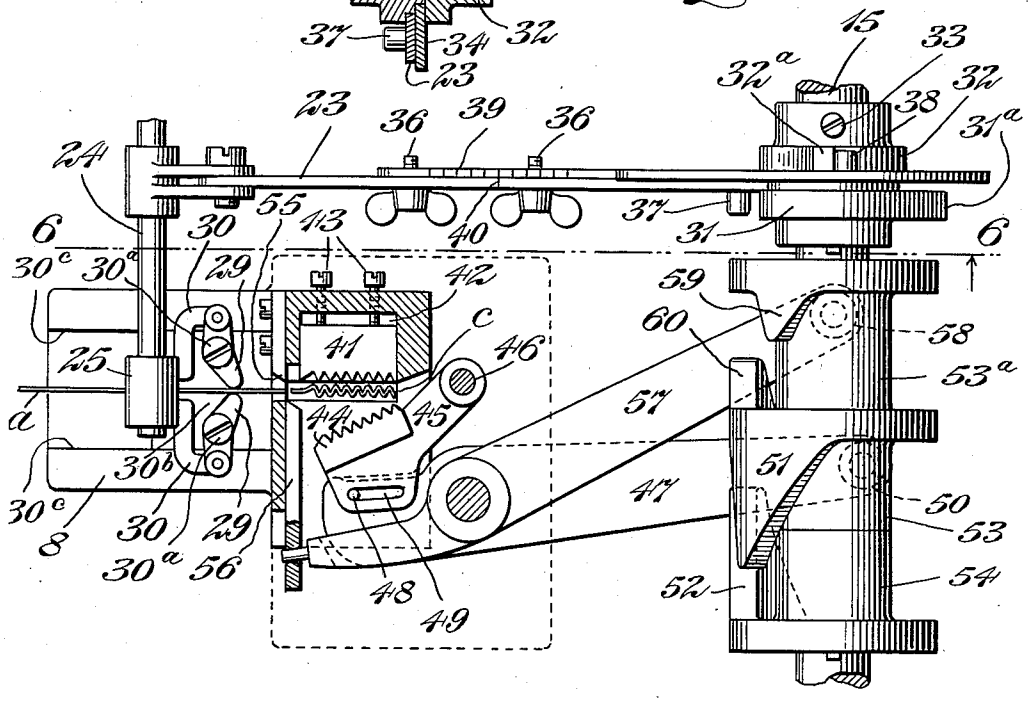


Fig. 5.



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7 SHEETS—SHEET 6.

Fig. 8.

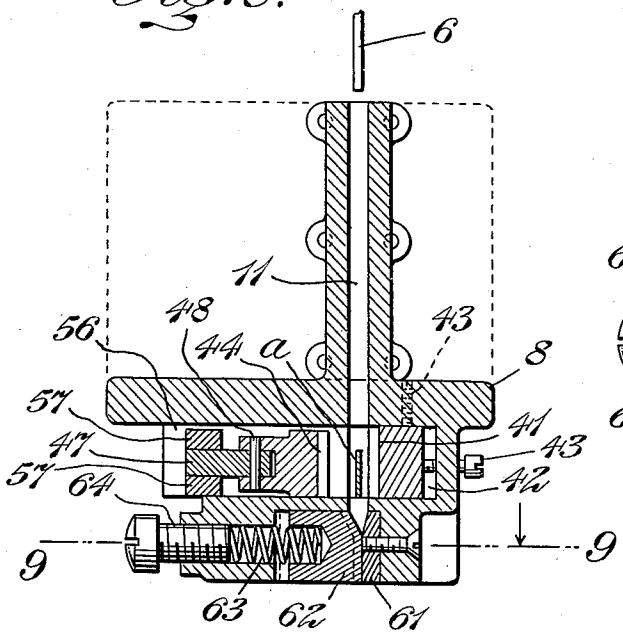


Fig. 9.

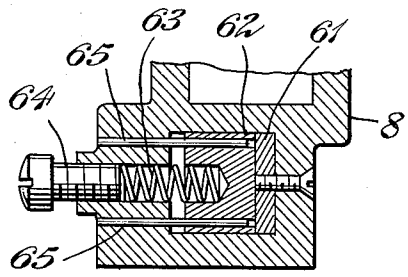


Fig. 10.

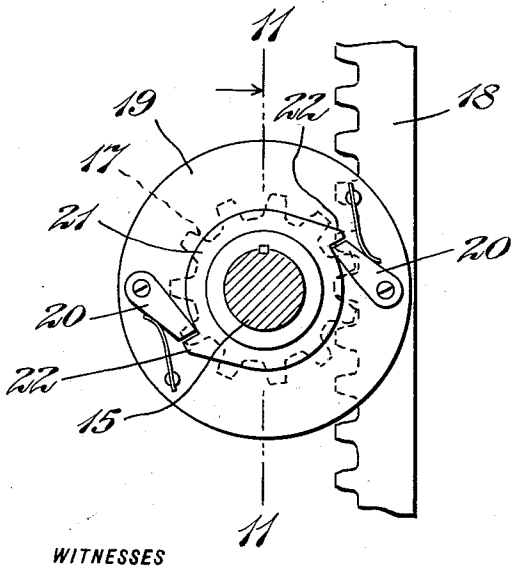
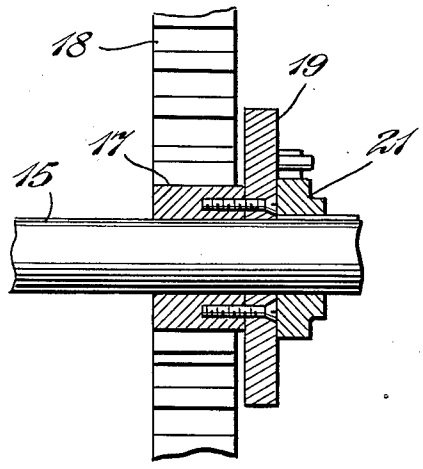


Fig. 11.



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Patented July 29, 1913.

7 SHEETS—SHEET 7.

Fig. 12.

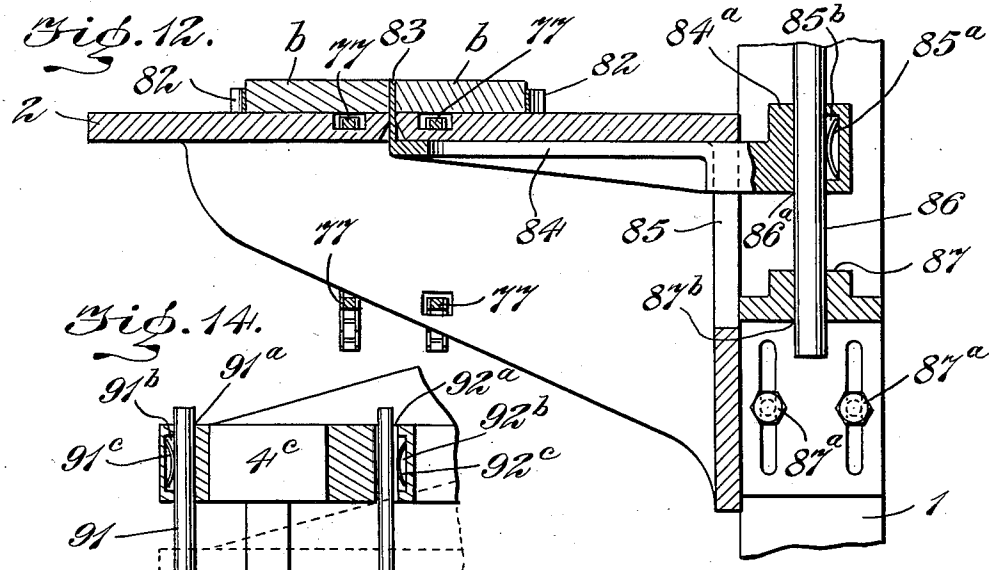


Fig. 14.

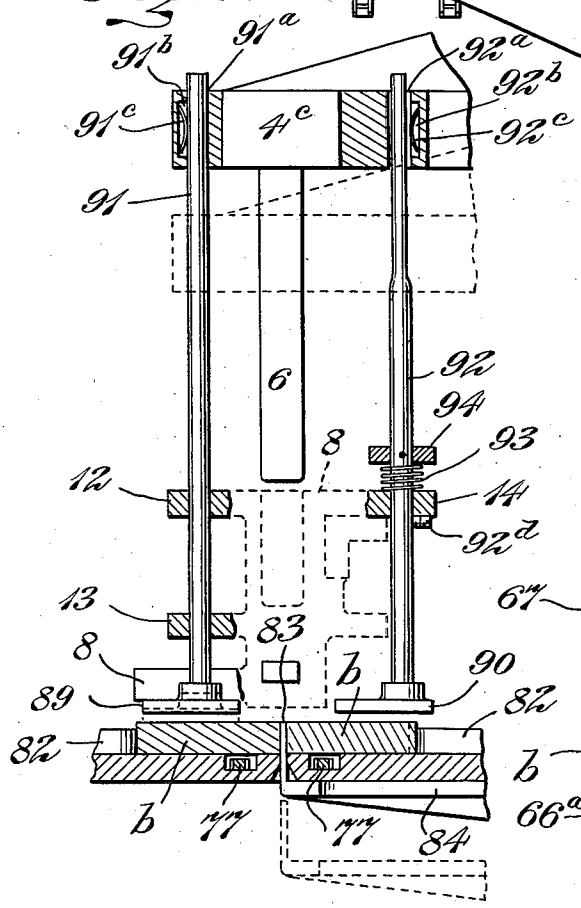
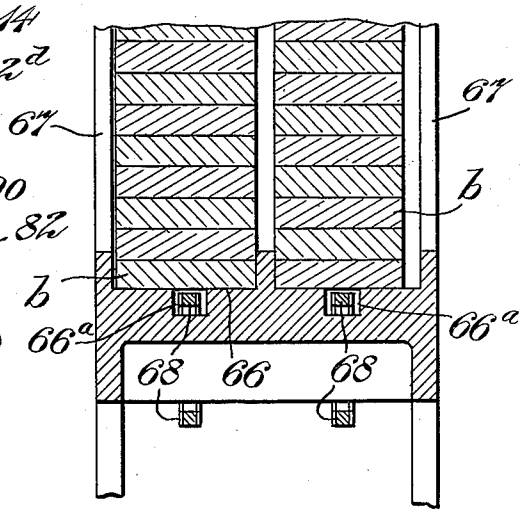


Fig. 13.



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UNITED STATES PATENT OFFICE.

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WOOD-FASTENER MACHINE.

1,068,990. Specification of Letters Patent. Patented July 29, 1913.

Application filed November 13, 1908. Serial No. 462,364.

To all whom it may concern:

Be it known that I, SAMUEL E. DUNHAM, of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Wood-Fastener Machines, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for forming and driving metallic fasteners to secure joints between pieces or sections of wood.

One of the objects of the invention is to provide a machine having devices for automatically feeding, positioning and discharging the work, that is to say, the pieces of wood to be secured together, in combination with means for automatically driving the fasteners.

Another object of the invention is to provide means for accurately positioning and holding the work while the fasteners are being driven.

A further object of the invention is to provide improved means for forming fasteners.

Still another object is to provide improved means for feeding the stock in the form of a metallic ribbon from which the fasteners are made.

All of the various objects of my invention and the manner of attaining them will appear in the following description, in which reference is had to the accompanying drawings.

In the drawings—Figure 1 is a front elevation of the machine, a portion of the work feeding mechanism being shown in section on line 1—1 of Fig. 4. Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a section taken on the line 3—3 of Fig. 2; Fig. 4 is a section taken on the line 4—4 of Fig. 1; Fig. 5 is a detail plan view of the stock-feeding mechanism and the fastener-forming devices, the latter being partially shown in section on line 5—5 of Fig. 2. Fig. 6 is a section taken on the line 6—6 of Fig. 5; Fig. 7 is a section taken on the line 7—7 of Fig. 6; Fig. 8 is a section taken on the line 8—8 of Fig. 2; Fig. 9 is a section taken on the line 9—9 of Fig. 8; Fig. 10 is a section taken on the line 10—10 of Fig. 1; Fig. 11 is a section taken on the line 11—11 of Fig. 10; Fig. 12 is a section taken on the line 12—12 of Fig. 4; Fig. 13 is a section taken on the line 13—13 of Fig. 1; Fig. 14 is a fragmentary sectional view taken on the line 14—14 of Fig. 3; Figs. 15 and 16 are fragmentary views showing portions of two sections of wood secured by fasteners of different shapes; and Fig. 17 is a perspective view of a portion of the stock from which the fasteners are made.

While my invention, at least in some of its aspects, is not limited to a particular form of work, the machine which I show and describe is especially designed to handle wooden strips or boards which it is desired to join laterally in the manufacture of boxes, cases, and the like.

The frame of the machine comprises columns 1, 1, which rise from a suitable base, omitted from the drawing to permit the showing of the machine on a sufficiently large scale. A work-supporting table 2 is mounted on the front of these columns, being secured by means of set screws 3 which provide for vertical adjustment of the table.

4 is a plunger head suitably mounted on the columns 1 and adapted to be reciprocated by any suitable means such as a connecting rod 5 which extends downward and at its lower end operatively engages the crank of a driving shaft (not shown). The plunger head 4 carries a forwardly extending arm 4^a having lateral extensions 4^b, 4^c which carry the fastener driving plungers 6, 6. These plungers are preferably adjustable toward and from each other so that they may be suited to the position of the fastener-forming and holding devices, and, moving with the plunger head, serve to drive home the fasteners after they are formed, as will be set forth hereinafter.

7 is a bracket secured to the columns above the table 2 and comprising the rear transverse part 7^r which is secured to the columns, the forwardly extending end parts 7^b, the forward transversely extending part 7^c, and the rearward extension 7^a of the part 7^c. Castings 8, 8 are adjustably mounted on the transverse bracket part 7^c, the latter being formed with a countersunk slot 9 to receive the heads of the securing bolts 10 and permit lateral adjustment thereof. Each of the castings 8 comprises a vertically

disposed plunger guide 11 and lateral extensions 12, 13 and 14, which serve as guides for the work clamps, to be referred to later.

The stock-feeding and fastener-forming devices which are arranged at the lower end of the plunger guides are all driven from a common prime mover shaft 15 which is rotatably mounted in bearing brackets 16, 16 carried by the bracket 7. This prime mover shaft is driven from the plunger head by means of the following devices: 17 is a pinion loosely mounted on the shaft near one end thereof, and 18 is a rack which, at its upper end, is loosely secured to the extension 4^c of the plunger head, and having collars 18^a, 18^b, with which the plunger head is adapted to contact on its downward and upward movements and thereby impart reciprocating motion to the rack, a guide for the lower end of the rack being provided in the rearward extension 7^d of the bracket 7. This rack meshes with the pinion 17 and rotates it in opposite directions as the rack moves up and down. The pinion 17 carries a disk 19, upon the outer face of which is mounted a pair of spring pressed pawls 20. 21 is a collar keyed to the shaft 15 and formed with ratch projections 22 which are arranged to be engaged by the pawls 20. The arrangement of the pawls 20 and the ratch projections 22 is such that on the downward movement of the plunger head the pawls will ride idly over the projections and upon the upward movement the pawls will engage the ratch projections to rotate the shaft in the direction indicated by the arrow in Fig. 2. It will be noted that owing to the loose connection between the plunger head and the rack 18 the collar 18^a of the rack at the completion of the down stroke will be supported above the plunger head, and the rack will not move upwardly until the plunger head on its up stroke contacts with the collar 18^a. Thus the rotation of the shaft 15 is delayed until the driving plungers have been raised sufficiently to clear the fastener forming devices before the latter are operated.

The prime mover shaft 15 carries near its middle part devices, presently to be described in detail, for giving a reciprocatory movement to a reach rod 23 which is connected at its forward end to a cross-head bar 24. At either end this bar 24 carries a collar 25 on which are mounted the devices for feeding the fastener stock *a* forward. In the machine, as shown, these feeding devices as well as the fastener-forming devices are provided in duplicate, and it will be understood that the description of these parts which follows applies to each set of devices.

The stock *a*, preferably in the form of a metallic ribbon having one edge beveled, as shown in Fig. 17, from which the fasteners *c* are made, is wound upon spools 26 which are rotatably mounted on vertical spindles 27 and between friction disks 28, the latter preventing the unwinding of the stock faster than is desired. From the spools the metallic ribbon is carried forward beneath the end of the cross-head 24 so as to be engaged by the feeding devices.

The feeding devices proper consist of a pair of dogs 29 which are pivotally mounted on arms 30 carried by the collar 25, said dogs being also pivoted at 30^a to a carrier block 30^b sliding in guides 30^c on the casting 8. The dogs 29 are arranged so that they can ride freely over the stock while being retracted but firmly clutch the stock on the return or feeding movement of the cross-head 24, thus advancing the stock in a position to be engaged by the fastener-forming devices.

The devices for giving to the reach rod 23 a reciprocatory movement comprise collars 31, 32 mounted on the prime mover shaft 15, the former preferably being keyed to the shaft 15 and the latter secured by means of a set screw 33. The collar 31 is formed with an extension or tooth 31^a, and the collar 32 has a similar tooth 32^a. The teeth 31^a and 32^a are, as shown, disposed ninety degrees apart. 34 is a U-shaped bar or yoke which is mounted to slide backward and forward on the collar 31, being retained in position between the shoulder 31^b and the adjacent face of the collar 32. One end of this yoke 34 is extended beyond the other and is adjustably secured to the reach rod 23, the latter being formed with a series of slots 35 through which clamping screws 36 extend to engage threaded holes in the arm of the yoke. The reach rod is provided with a cylindrical lug 37 and the short arm of the yoke is provided with a similar lug 38, these lugs being disposed in position to be engaged by the teeth 31^a and 32^a respectively, so as to give the reach rod a reciprocatory motion as the shaft 15 rotates in the direction of the arrow in Fig. 6.

It will be seen that by loosening the clamping screws 36 the yoke 34 may be adjusted longitudinally of the reach rod 23 and the distance between the lugs 37 and 38 thus varied to any desired extent within the limits determined by the slots 35. In this way the length of the stroke given to the reach rod and consequently to the stock feeding devices may be varied to any desired extent for the purpose of varying the length of the fastener formed. As a matter of convenience I cut a scale on the long arm of the yoke 34, as at 39, and similarly place an index mark 40 on the reach rod 23, these marks serving to indicate the length of stroke of the feeding devices for any particular adjustment of the yoke with respect to the reach rod.

Referring now to the fastener-forming devices, 41 is a stationary die disposed in a recess 42 formed in the lower part of the plunger guide 11, said die being secured in position by screws 43. Opposite the die 41 is a swinging die 44 carried on the arm 45 which is pivotally mounted at 46. The opposing faces of the two pieces are serrated, as clearly shown in Fig. 5, and when the metallic ribbon stock is fed forward between the said dies and subjected to pressure the stock is crimped or corrugated in the desired manner.

The swinging die 44 is actuated by means of a lever 47 which carries a pin 48 in operative engagement with a slot 49 formed in the arm 45. The other end of the lever 47 carries a roller 50 in position to be engaged by cams 51 and 52 which are formed on sleeves 53 and 54 respectively, keyed to the prime mover shaft 15. The cam 51 serves to move the lever in a direction to carry the swinging die 44 toward the stationary die, while the cam 52 acts to move the parts in the reverse direction.

As each fastener is formed it must be severed from the stock and for this purpose I provide shear devices comprising a stationary blade 55 having its cutting edge disposed adjacent the ribbon stock, and a sliding blade 56. The last named blade is actuated by means of a lever 57 which carries a roller 58 in position to be engaged by cams 59 and 60 on the sleeves 53, and 53^a, the cam 59 serving to effect the cutting stroke of the sliding shear blade 56, while the cam 60 retracts the blade.

The fastener having been formed and severed from the stock falls from between the crimping dies and rests upon the upper sides of guide jaws 61 and 62, which are clearly shown in Figs. 8 and 9. The jaw 61 is stationary while the jaw 62 is slidably mounted, being yieldingly held in contact with the stationary jaw by a spring 63, the tension of which may be varied by means of the screw 64. Pins 65 guide the jaw 62 in its movement and prevent it from falling. As the driving plunger descends and engages the fastener to force it downward and drive it home in the work disposed beneath the guide jaws, the jaw 62 is forced back so as to permit the passage of the fastener, yet holding it upright in proper position as it is forced into the wood which is supported on the table 2.

The work, which is in the form of wooden strips *b*, *b*, is fed forward, positioned and discharged in the following manner: At the right of the table 2, and preferably at the same level, is a table 66, which may be supported from the main base of the machine, or otherwise, as desired. Upon this table, strips *b*, *b*, are piled in two tiers, as shown in Figs. 1 and 13, the strips being kept in position by a retaining rack 67. 68, 68 are sprocket chains which are mounted on sprocket wheels 69, 69, and 70, 70, the former wheels being mounted on a shaft 71 carried by a bracket 72 at the right end of the table 66, while the wheels 70, 70 are keyed to a shaft 73 which is carried by a bracket 74 at the other end of the table. The upper face of the table 66 is formed with grooves 66^a to receive the upper passes of the sprocket chains 68, so that the main bodies of the chains do not extend above the upper surface of the table. Each chain, however, has two of its links formed with a projection or dog 68^a, 68^b, which are adapted to project above the top of the table and to engage the right end of the bottom strip *b* and feed it forward to the work-supporting table 2. In Figs. 1 and 4, one pair of such strips are shown in full lines in position on the work table 2, while another pair are shown in position to be fed forward. The chains 68, 68 are driven from the shaft 73 and it in turn is driven by a sprocket wheel 75 and chain 76, the latter being driven by a sprocket wheel, not shown but preferably mounted on the main drive shaft which actuates the plunger head 4. The two fasteners having been simultaneously driven to unite the two strips *b*, the latter are then discharged from the table by means of a pair of sprocket chains 77 which are mounted on sprocket wheels 78 running idly on the shaft 73 and which chains are driven by means of wheels 79 keyed to the shaft 80 carried by a bracket extension 81 of the table 2, which shaft, in turn, is driven by a sprocket wheel, not shown but preferably mounted on the main drive shaft which actuates the plunger head 4. Each of the chains 77 has one of its links formed with a projection or dog 77^b which is adapted to engage the ends of the wood strips or boards *b* and discharge the latter from the supporting table 2, said table having its upper surface grooved to receive the chains, as clearly indicated in Fig. 12. The sprocket wheels 79, 79 are made of larger diameter than the wheels 78, 78, 69, 69, and 70, 70, in order that the sprocket chains 77 may travel at a faster speed than the chains 68, 68, and insure the removal of the fastened strips from the work table 2 before the strips to be fastened are fed forward and to allow time for the positioning blade to come into operative position between those operations.

As the strips of wood *b* are advanced on the work-supporting table 2, they are laterally engaged by springs 82 mounted on the table 2 and which tend to press the strips together, but in order that the strips may be accurately centered or positioned I provide a positioning blade 83 which projects upward through a slot in the table 2 and which is carried by an arm 84, slidably mounted

on guides 85, which are preferably formed on the table casting, as is clearly shown in Fig. 12. The arm 84 has an extension 84^a which is provided with a recess 85^b, wherein is placed a friction spring 85^a adapted to engage a sliding rod 86 passing through an aperture 86^a in the extension 84^a and rigidly secured at its upper end to the plunger head 4. The friction spring 85^a is adapted to create sufficient friction between the sliding rod and the arm 84 to hold the latter in any adjusted position on the former against the action of gravity. Between the columns 1 and below the extension 84^a of the positioning blade arm 84 is provided an adjustable stop 87, which is vertically adjustable to a limited extent by means of the set screws 87^a and has an aperture 87^b therein for the downward travel therethrough of the sliding rod 86. Due to the friction spring in the extension 84^a of the arm 84, the latter will follow the downward movement of the rod 86 until it is arrested by the stop 87, and will follow the upward movement of said rod until it contacts with the lower face of the table 2. Consequently, the positioning blade 83 will be in its upper or operative position during approximately the last two-thirds of the upward stroke of the plunger head 4, and as the wood strips or boards *b* are fed forward between the springs 82, they are pressed against the blade 83 and thus accurately positioned. By means of the adjustable stop 87 and the set screws 87^a, the raising of the positioning blade 83 into operative position may be timed to such fractional part of the upward stroke of the plunger head as may be desired.

To insure the holding of the strips in the desired position during the driving movement, the following devices are provided: 89 and 90 are clamping plates, the former carried by upright rods 91, and the latter by upright rods 92. The rods 91 are slidably supported in the bracket extensions 12, 13 of the casting 8, while the rods 92 are similarly guided by the extensions 14 of the casting 8. At their upper ends both the rods 91 and the rods 92 are slidably mounted in guide-ways 91^a, 92^a in the plunger head 4, adjacent to which guideways and communicating therewith are recesses 91^b, 92^b. In those recesses are secured friction springs 91^c, 92^c, which are adapted to contact with the rods 91, 92. The friction between the rods 91 and the plunger head 4, due to the friction springs 91^c, is sufficient to not only enable the plunger head to support the rods 91 against the force of gravity, but to overcome a strong counter force, and this friction is exerted during the entire travel of the plunger head. The rods 92 have their upper portions of smaller diameter than their remaining portions, and at such reduced portions no friction is exerted by the friction springs 92^c between the plunger head 4 and the rods 92, and when the plunger head is in its uppermost position (as shown in Fig. 14) the rods 92 are supported above the table 2 by means of coil springs 93 interposed between the guides 14 of the casting 8 and collars 94 rigidly secured to the rods 92. However, on the downward movement of the plunger head 4, the friction springs 92^c meet the enlarged portions of the rods 92, and the friction then exerted not only overcomes the force of the springs 93 but is likewise sufficient to overcome a strong counter force. Stops 92^d are secured to the rods 92 to contact with the lower surface of the guides 14 and thereby limit the upward movement of said rods 92; while the upward movement of the rods 91 is limited by the clamps 89 contacting with the lower face of the casting 8, as indicated in Fig. 14. Thus arranged, as the plunger head moves on its down stroke the rods 91 move downward, forcing the clamping plates 89 downward and into engagement with the front wood strip or board *b*. As soon as the clamping plate 89 has engaged the strip *b* the positioning blade 83 is carried downward, with the down stroke of the plunger head 4 and sliding rod 86, and as it passes below the upper surface of the table the spring 82 pressing against the rear strip *b* forces the latter forward against the front strip. This having taken place, the plunger head, continuing its downward movement, engages, by means of the friction springs 92^c with the rods 92, overcoming the force of the spring 93 and forcing the clamping plate 90 down into engagement with the rear wood strip *b*. In this manner both strips *b* are held firmly in position while the fastener is driven during the last part of the down stroke of the plunger.

The operation of the machine will be readily understood from the above description. Starting with the parts in the position shown in Figs. 1 and 2, that is to say, the plunger head having just completed its upward movement and about to start on its downward movement, and assuming that a fastener has been formed by each set of forming devices on the upward movement, and further assuming that on this upward movement a pair of wood strips *b* have been fed forward onto the work-table (as shown in full lines in Figs. 1 and 4), with the positioning blade 83 between them and the springs 82 pressing them against the positioning blade; as the plunger head moves downward, the clamps 89 clamp the front strip *b* to the work table 2, and at the same moment the positioning blade is moved downward below the surface of the table and one of the springs 82 presses the rear unclamped strip to the side of the front strip which has been thus clamped; by this

time the friction springs in the plunger head have contacted with the enlarged portion of the rods 92, and, as the result, the clamps 90 immediately clamp the rear strip *b* to the work table; upon further movement the plunger engages the upper edge of the fastener, forces the latter down between the guide jaws 61 and 62 and drives it home into the wood and is itself withdrawn. At this time the feed dogs 77[a] of the chains 77, and the feed dogs 68[a], 68[b] of the chains 68—all of which remained idle on the down stroke of the plunger head—begin their movement. The feed dogs 77[a], moving faster than the feed dogs 68[a], 68[b], engage the right ends of the wood strips, quickly carrying them to the left along the table and discharging them. Thereupon, the positioning blade 83 has come into operative position above the surface of the work table 2, with the up stroke of the plunger head 4 and sliding rod 86, and the feed dogs 68[a] have engaged the bottom strips *b*—which moved downward as the preceding strips were forced from under them—and fed them forward to the work table in position to be fastened. Meanwhile, the plunger head has been moving upwardly, on its return stroke. During a portion of this movement, it is without effect upon the rack 18, but moves idly thereon in order to allow time for the plungers 6 to be withdrawn from between the fastener forming devices, but when it contacts with the collar 18[a] of the rack 18, the latter drives the pinion 17 in the reverse direction and the pawls 20 come into engagement with the ratchet teeth 22 of the collar 21, so that during the remainder of the up-stroke of the plunger head, the prime mover shaft 15 is positively driven. During the first part of this rotation of the shaft 15, the feed devices are advanced and the ribbon stock fed forward a predetermined amount between the forming dies. Then as the rotation of the prime mover shaft continues, the swinging die 44 is moved upon the stationary die by the action of the cam 51 upon the lever 47, and the metallic ribbon is pressed into the desired form of the fastener. While this forming operation is in progress, the sliding shear blade 56 is advanced by the operation of the cam 59, thus severing the fastener from the stock. During the latter part of the up-stroke of the plunger head the cams 52 and 60 operate to return the swinging die and the sliding shear blade to their initial position and simultaneously the feed devices are moved back to their initial positions. The cycle of operations is thus completed at the end of the up stroke of the plunger head and as the reciprocation of the plunger head continues the cycle of operations is indefinitely and automatically repeated.

The advantages incident to the various features of construction and combinations of parts are clear from the above description, with the possible exception in the case of the die mechanism which I employ. It is to be noted that by the use of the swinging die pivotally mounted as shown, the action of the dies upon the stock begins at one end of the dies and progresses gradually to the other end as the swinging die is forced home. I thus avoid a serious difficulty attendant upon the use of a reciprocating die, namely, the excessive straining of the metal, which may go so far as to render the fastener practically worthless. It is clear that in the case of the swinging die which I employ the strain of the metal is not localized as in the case of the reciprocating die because the fastener blank is not subjected to uniform pressure throughout its length at the same time.

I am aware that corrugated rolls have been employed for forming metallic fasteners, but it is obvious that the shapes which can be given to the metal by means of rolls are limited in comparison with the shapes which can be produced by means of dies. For example, fasteners of the shape shown in Fig. 15 of the drawings could not be produced by means of rolls. In the operation of my machine, if it is desired to use fasteners of various shapes for different kinds of work, dies properly faced to produce such fasteners can be readily substituted.

I have shown and described a machine adapted to automatically form crimped or corrugated fasteners from continuous strips or ribbons of metal, to drive the fasteners so formed edgewise into the pieces of wood, and to feed forward, position and discharge the said pieces of wood; but it will be understood that it is within the contemplation of my invention that one or another of these functions may not be performed automatically, or may not be performed at all by the machine. For example, the fasteners may be formed by independent means and fed to the driving mechanism in any preferred manner. Again, it will be seen that in some of its aspects the invention is not restricted to the particular form of fastener which is shown and described.

In referring to the material to be joined or to receive the fasteners, I have used the term "strips" and have referred particularly to the joining of pieces or strips of wood, but I wish it to be understood that I have used this term for the sake of convenience, as other material than wood may be joined, and such material may be in any form.

What I claim is:

1. The combination with the driving mechanism of means for alining the strips in driving relation thereto, said means compris-

ing an element adapted to project at predetermined times between the adjacent edges of the two strips, and means for bringing said adjacent edges into contact when the element is removed from therebetween.

2. In a machine of the class described, the combination with the driving mechanism of means for alining relative thereto a plurality of strips side by side, said means comprising oppositely acting spring members adapted to force the strips to centering position beneath the driving mechanism.

3. In a machine of the class described, the combination with the driving mechanism of means for alining the strips relative thereto, comprising a plurality of oppositely acting members and a stop located therebetween.

4. The combination with the driving mechanism, of means for alining the strips relative thereto, including a movable stop adapted to lie between the adjacent edges of two strips, and oppositely acting pressure devices adapted to bring the adjacent edges of the strips into contact after the stop is moved from therebetween.

5. The combination with the driving mechanism, of means for alining the strips relative thereto, said means comprising a reciprocable stop adapted to lie between the adjacent edges of two of the strips, means for moving said stop from such position, and means for bringing the adjacent edges of the strips into contact when the stop has been removed from therebetween.

6. In a machine of the class described, the combination of means for driving joint securing fasteners, said means including a reciprocating plunger head and a plunger carried thereby, means for feeding the strips to be joined, means for positioning the strips relative to the driving plunger, and means for clamping the strips into position during the driving operation, said positioning means and clamping means being driven by the plunger-head.

7. In a machine of the class described, the combination with the driving mechanism for driving a fastener bodily into the strips to be joined, of positioning or alining means for bringing a plurality of such strips into edge-to-edge contact, clamping mechanism, said positioning means and clamping mechanism being actuated by the driving mechanism, and means common to the fastener driving means, positioning means and the clamping means, for actuating such parts.

8. In a device of the class described, the combination with the driving mechanism for driving a fastener bodily into the strips to be joined, alining or positioning means for bringing a plurality of such strips into edge-to-edge contact, including oppositely acting members to bring the strips into edge to edge alinement beneath the driving means, and a clamp acting to hold said strips during the driving operation.

9. The combination with the driving mechanism, of fastener forming mechanism and means for feeding the stock to the fastener forming mechanism, a power shaft and means for varying the feed, said means including a horizontally disposed member positively connected to the feeding devices and a yoke adjustably connected to said member at one end and at the other end movably mounted on the power shaft.

10. The combination with the driving mechanism of the fastener forming mechanism, means for feeding the stock to the fastener forming mechanism, a power shaft common to both the fastener forming mechanism and the stock feeding means for operating said mechanism and means, and a divided horizontally-adjustable yoke connection between said shaft and the stock feeding means.

11. The combination with the driving mechanism of the fastener forming mechanism, devices for feeding the stock to the fastener forming mechanism, said devices including a drive shaft and feeding members for gripping the stock, and means for varying the feed, said means including a rod connected to the feeding devices having straight-line motion on a horizontal plane, and a yoke member extensibly connected to said rod, reciprocating in the same direction, and having its other end slidably mounted on the drive shaft.

12. The combination with the driving mechanism of the fastener forming mechanism, devices for feeding the stock to the fastener forming mechanism, said devices including a drive shaft, feed members for gripping the stock, and means for varying the feed including a rod connected to said feed devices having reciprocating rectilinear motion on a horizontal plane, a projection-carrying yoke longitudinally extensible on said rod and reciprocating in the same direction, projection-carrying collars on said shaft slidably supporting said yoke, and a scale carried by said yoke for indicating the length of stroke of the feeding devices.

SAMUEL E. DUNHAM.

Witnesses:
W. C. ABBOTT,
LAURA E. SMITH.