

Dec. 23, 1941.

M. S. LOPES, JR

2,267,206

STAPLING HEAD

Filed April 7, 1939

3 Sheets-Sheet 1

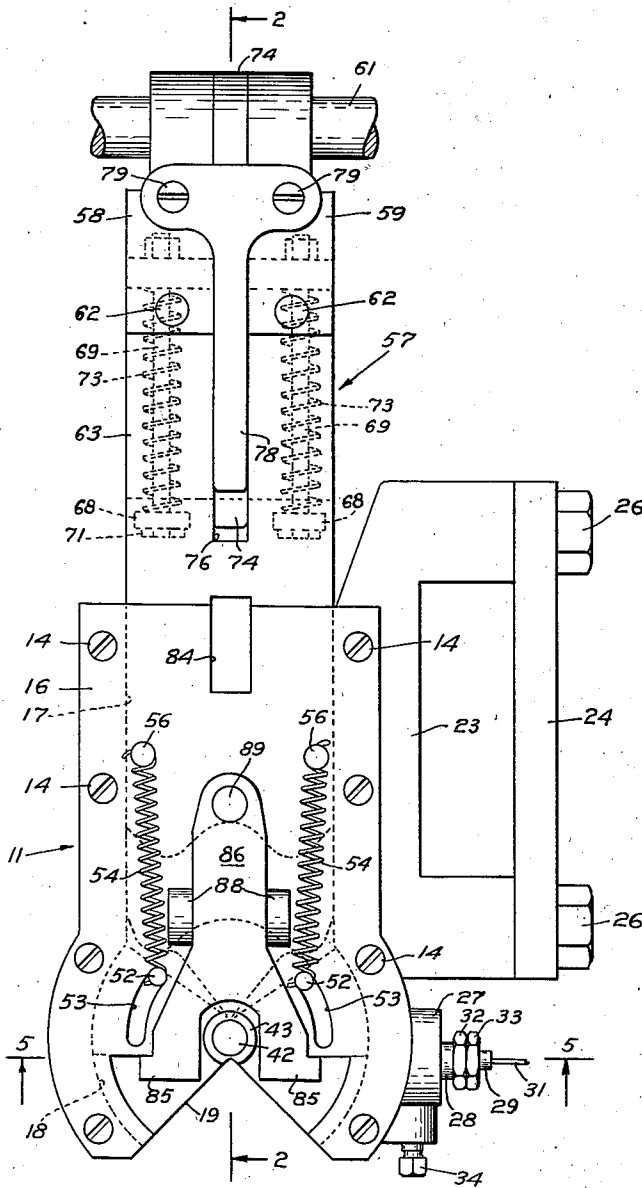


Fig. 1.

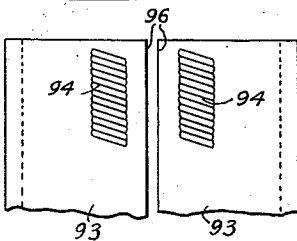


Fig. 9.

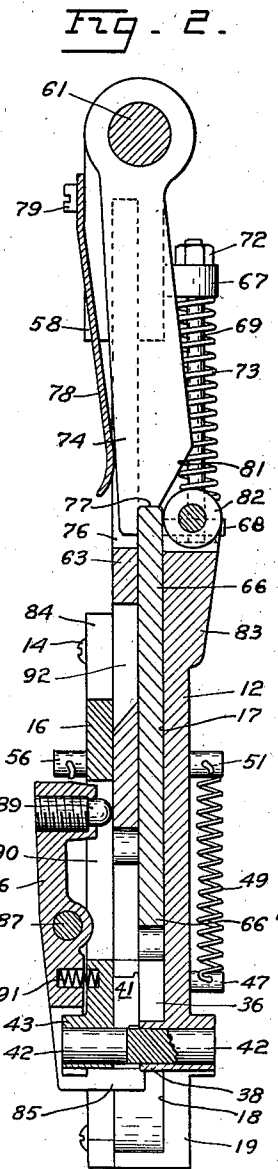


Fig. 2.

BY

INVENTOR.
MANUEL S. LOPES, JR.
Charles O. Bruce
ATTORNEY.

Dec. 23, 1941.

M. S. LOPES, JR

2,267,206

STAPLING HEAD

Filed April 7, 1939

3 Sheets-Sheet 2

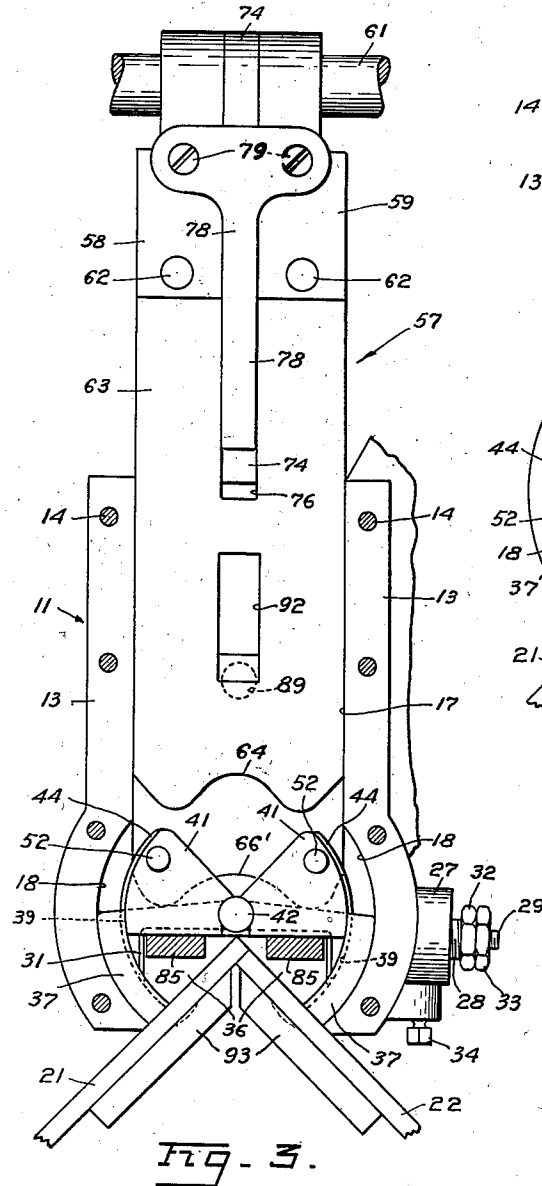


Fig. 3.

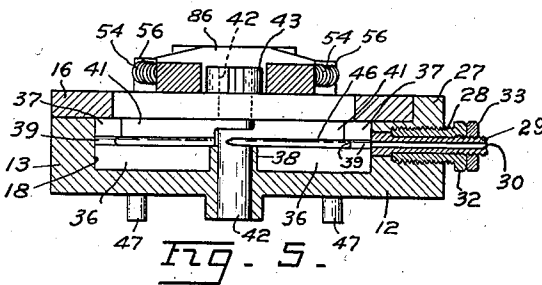


Fig. 5.

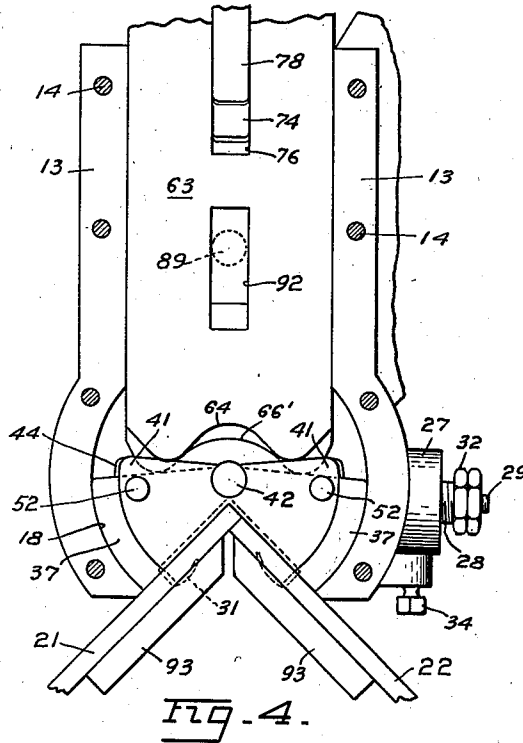


Fig. 4.

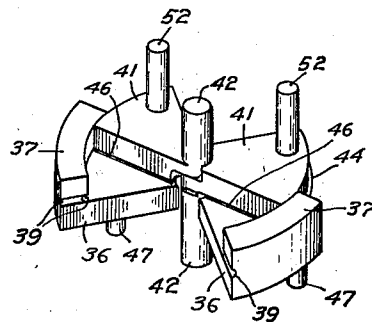


Fig. 6.

INVENTOR.
MANUEL S. LOPES, JR
BY *Charles O. Bruce*
ATTORNEY.

Dec. 23, 1941.

M. S. LOPES, JR

2,267,206

STAPLING HEAD

Filed April 7, 1939

3 Sheets-Sheet 3

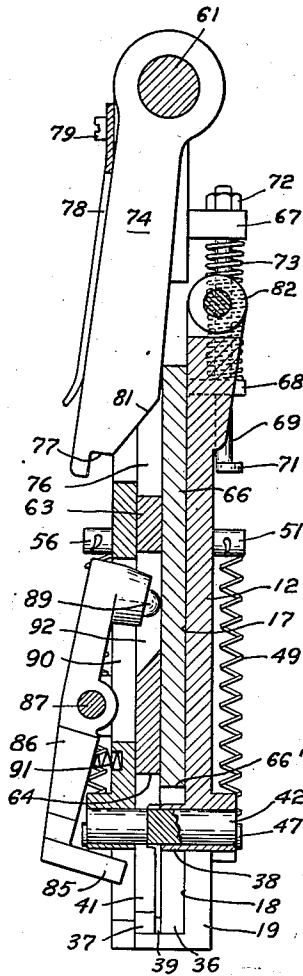


Fig. 1.

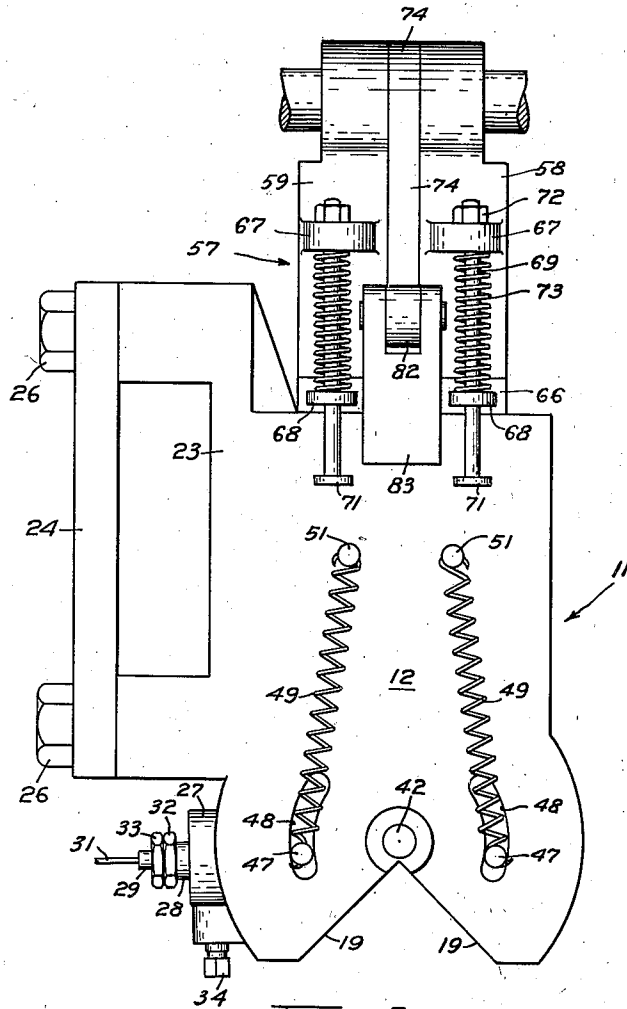


Fig. 8.

INVENTOR.
MANUEL S. LOPES, JR.
BY *Charles O. Bruce*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,267,206

STAPLING HEAD

Manuel S. Lopes, Jr., Alameda, Calif.

Application April 7, 1939, Serial No. 266,555

13 Claims. (Cl. 1—11)

My invention relates generally to stapling apparatus and more specifically to a stapling head for stapling together the walls of a box or the like.

The principal object of my invention is to provide improved means for sequentially forming a staple from a continuous wire and driving said staple around a box corner.

A further object of my invention is to provide a stapling head wherein rotary formers and drivers are employed to form and drive a staple around a box corner.

Another object of the invention is the provision in a stapling head of means for guiding the staple ends toward the sides of the box corner during the driving operation.

Still another object of my invention is the provision of a stapling head of simple construction yet highly efficient in operation.

My invention possesses numerous additional objects and features of advantage, some of which, together with the foregoing, will become apparent upon perusal of the following description. It is to be understood, however, that I do not limit myself to this disclosure of the species of my invention since I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawings:

Figure 1 is a front elevational view of a stapling head incorporating my invention.

Figure 2 is a sectional view of the head taken along the line 2—2 of Figure 1.

Figure 3 is an elevational view of the stapling head with the front plate removed so as to show the relation of parts after the staple legs have been formed in the wire.

Figure 4 is a fractional elevational view similar to Figure 3 but showing the relation of parts after the staple has been driven around the box corner.

Figure 5 is a sectional view of the head taken along the line 5—5 of Figure 1.

Figure 6 is a perspective view of the formers and drivers as they appear when moved into the position shown in Figure 3.

Figure 7 is a sectional view similar to Figure 2 but with the parts moved into the position shown in Figure 4.

Figure 8 is an elevational view looking at the back of the stapling head when the parts thereof have been moved into the position shown in Figure 7.

Figure 9 is a plan view of the clinching blocks

showing the angular displacement of the clinching grooves in the faces thereof.

Broadly stated, the structure of my invention comprises a frame preferably of cast construction which has its bottom portion cut away to fit a corner of a box or container. Means is provided on the frame for positioning a wire across the apex of the box corner and a movable anvil carried by the frame is provided to underlie the wire. A movable element slidably disposed in the frame is also provided. Forming means preferably rotatably mounted on the frame and actuated by the first movement of said movable element is provided for bending the wire over the anvil to form staple legs in the end portions thereof and means is provided for withdrawing the anvil from beneath the wire after the staple legs have been formed. Means preferably rotatably mounted on said frame is also provided which is adapted to be actuated by further movement of said movable element to bend the intermediate portion of the wire around the apex of the box corner and to simultaneously drive the staple legs into the sides of the corner, while resilient means is supplied for returning the forming and driving means to their normal position.

In greater detail and with reference to the preferred embodiment illustrated in the drawings, the structure of my invention comprises a frame or housing generally indicated by the numeral 11. This frame is preferably of cast construction and is formed with a back member 12 having integral side walls 13 rising therefrom to which is removably secured by means of cap screws 14 a front plate 16. There is thus formed a passage 17 extending longitudinally through the frame which is enlarged at its lower portion 18 by arcing the side walls outwardly about a common center. The bottom portion of the frame is cut away as at 19, see Figures 1, 3 and 8, to receive abutting sides 21 and 22 of a box corner. On one side of the frame and preferably formed integrally therewith I provide a U-shaped arm 23 having a clamping plate 24 secured thereto by means of bolts 26 for securing the frame to a suitable support.

Means is provided for positioning a wire across the apex of the box corner. For this purpose I provide one side wall 13 with an annular apertured boss 27 adapted to threadedly receive a sleeve 28 which in turn supports a member 29 preferably of tempered steel having a longitudinal aperture 30 therethrough whereby one end of a continuous wire 31 may be inserted and positioned across the portion 18 of passage 17

directly above the apex of the box. I provide the sleeve 23 with a hexagonal head 32 by means of which the sleeve may be turned in the boss to advance or withdraw the same therein or therefrom. The sleeve is adapted to threadedly receive, at one end, the member 29 and is thereby connected for movement therewith as well as relative thereto; thus the inner end of the member 29 may be adjusted with reference to the inner face of the wall 13. To lock the sleeve 23 and member 29 against relative movement, a lock nut 33 threaded on the member and adapted to bear against the head 32 of the sleeve is provided. Turning of the sleeve in the boss is prevented by means of a set screw 34 threaded through the side of the boss.

Disposed within the portion 18 of the passage I provide a pair of formers 36 of segmental shape each having a peripheral flange 37. The formers are positioned for rotation about a centrally apertured hub 38 formed on and projecting from either face of the back member 12. It will be observed that the periphery of each flange is in sliding contact with the inner face of the arcuate-shaped portion 18 of the passage and that the combined thickness of the flange and former is substantially equal to the width of the passage. Each flange where it joins the former is provided with a groove 39 which is extended across the lower end of the flange and forms a track in which the wire may slide. I prefer that the formers be of such character as to be interchangeable so that if they wear unevenly they may be interchanged and maximum use and efficiency secured.

A pair of rotary hammers 41 are provided, each of which is also preferably segmental in shape and is provided with a spindle 42 one of which is journaled in the aperture of hub 38 and the other in an apertured hub 43 formed on the front plate 16 of the frame. The thickness of the hammers is substantially equal to that of the flanged portion of the formers, and the peripheries of the hammers are disposed for sliding contact with the inner face of the flanges 37. Each of hammers 41 is provided with a bead 44 on its periphery which is adapted to slide in the groove 39 of its adjacent flange 37; and extending along the bottom edge of the hammers adjacent the face of the formers and in line with the groove 39 as extended across the end of the flanges I provide a channel 46. This channel in combination with the grooves 39 on the end of the flanges serves, when the formers and hammers are positioned as shown in Figure 1, as a continuous track to guide and direct the wire 31 across the portion 18 of the passage. In order that this directing may be positive I prefer that the member 29 and sleeve 23 slant upwardly in the boss 27 at a slight angle so that the end of the wire will tend to ride in the track under a slight pressure as it passes therealong.

In order to normally place the formers and hammers in the position illustrated in Figure 1, I prefer to provide each former with a leg 47 which projects through an arcuate slot 48 formed in the back member 12. A spring 49 connects this leg to a fixed lug 51 on the frame and serves to resiliently hold the former in its normal position. The hammers on the other hand are each provided with a leg 52 which projects through a similar slot 53 in the front plate. A spring 54 connects leg 52 to a fixed lug 56 on the frame and likewise holds the hammers in their normal position.

Means is provided for actuating the formers and hammers. For this purpose I provide a movable element generally indicated by the numeral 57 which comprises a pair of spaced head members 58 and 59 journaled on a supporting shaft 61 the latter being adaptable for connection to any well known type of reciprocating mechanism which, since it forms no part of the invention, is not shown. Secured to the head members in any well known manner, such as by rivets 62, depends a driver 63 which is slidably disposed in the passage 17 of the frame and is adapted to be so positioned that upon its downward movement in the frame the lower end 64 thereof, which is shaped as best shown in Figures 3 and 4, will contact the top edges of the hammers 41 and force them to rotate on their spindles 42.

A second driver 66 connected to the head members and supported adjacent the first mentioned driver in such manner as to permit the drivers to move relative to each other is provided for actuating the formers 36. The lower end 66' of driver 66 is shaped similarly to driver 63 and slidably contacts the edges of the formers to cause their rotation. Here the head members are provided with rearwardly projecting integral shoulders 67 and the upper portion of driver 66 with rearwardly projecting tongues 68. The shoulders and tongues are suitably apertured to slidably receive rods 69 which are secured against withdrawal by means of fixed washers 71 on one end and nuts 72 on the other. A coiled expansion spring 73 is disposed around each rod with one end bearing against the shoulder and the other against the tongue 68 and serves to maintain the normal relative positions of the drivers and permits, upon compression, relative movement therebetween.

A finger 74 journaled on the shaft 61 between the head members is disposed to swing in a slot 76 formed in driver 63. The distal end of the finger is provided with a shoulder 77 adapted to normally ride upon the top end of the driving member 66 in which position it is normally held by the resilient arm 78, the latter being secured to the head members by means of screws 79. The body of the finger adjacent the shoulder is provided with an angularly disposed portion 81 which is adapted to bear against a roller 82, the latter being suitably mounted for rotation and supported in a block 83 formed on the back portion 12 of the frame. It will be observed that as the finger with its associated movable parts moves downwardly, the angular portion 81 thereof will contact the roller in such manner that the finger will be crowded outwardly against the tension of the resilient arm 78 until the shoulder 77 is displaced from the top of the driver 66. This driver can then remain stationary while the other parts continue further downward movement. To prevent the finger from contacting the frame and interfering with further movement of parts, I provide a slot 84 in the upper portion of the front plate 16 through which the finger may freely swing.

Means is provided for cooperation with the formers to form staple legs in the end portions of the wire. In this connection I provide a movable anvil 85 preferably formed in two parts to permit its placement beneath the wire on either side of the box corner. A supporting arm 86 preferably formed integrally with and extending laterally from the anvil is provided in its medial portion with a shaft 87 the ends of which are journaled in ears 88 formed on the front plate 16 of

the frame. The distal end of the arm is provided with an adjustable button 89 which is adapted to ride upon the face of driver 63 through the opening 90 in the front plate. A spring 91 bearing against the front plate and the arm on the opposite side of shaft 86 from the button serves to tilt the arm on its shaft and maintain the button against the driver 63 under a yielding pressure.

It will be observed that when the anvil arm is in the position shown in Figures 1 and 2, it serves to position the anvil beneath the wire and hammers and between the flanges of the formers; that as the formers are rotated by the downward movement of the driver 66 the wire is sheared off against the end of the tempered steel member 29, and the end portions of the wire are bent downwardly by the former flanges 37 over the side of the anvil to form the staple legs. The formers then continue their movement until they rest against the sides of the box corner leaving the staple in the position shown in Figure 3, with the ends of the legs riding in the grooves 39 of the flanges and directed toward the sides of said corner. At this point in the path of unitary movement of drivers 63 and 66 the shoulder 77 of finger 74 is forced off the top end of driver 66 by roller 82 and thereafter driver 66 remains stationary while driver 63 continues further downward movement. At this point in the path of movement of driver 63 the button 89 of the anvil arm which is under pressure of spring 91 rides into a recess 92 formed in driver 63 and into contact with driver 66, thereby rotating the arm upon its shaft 87 to withdraw the anvil from beneath the wire and out of the path of movement of the hammers. As driver 63 continues its downward movement the hammers are actuated to bend the intermediate portion of said wire around the box corner and simultaneously drive the legs into and through the sides of the corner where they are clinched upon the inner faces thereof by a pair of clinching blocks 93 each of which is preferably provided with a plurality of parallel guiding recesses 94 angularly displaced with reference to the sides 96 of the blocks in order to direct the clinched ends of the staple at an angle to the intermediate portion of the staple. In case the box is made of wood this angular displacement of the clinching ends substantially increases the staple's holding power and effectiveness.

After the staple has been driven around the box corner it is obvious that as the movable element 57 with its drivers returns to its normal position the anvil, formers and hammers will automatically resume the positions shown in Figure 1, and another section of the continuous wire may be positioned across the apex of the corner to be acted upon in the manner heretofore described.

It will be noted that the ends of the staple legs when bent over the anvil by the formers rest in the grooves 39 of the former flanges and that these grooves form continuous tracks by which the staple legs are directed to the sides of the box corner; further, that the channel 46 of the hammers serves to hold the intermediate portion of the wire against the face of the formers during the bending and driving operation and thereby prevents lateral movement or displacement of the staple.

I claim:

1. A stapling head for sequentially forming a staple from a continuous wire and driving said staple around a box corner which comprises, a

frame cut away to fit said box corner, means on said frame for positioning a section of said wire across the apex of said corner, means for severing said wire, a movable anvil carried by said frame and adapted to extend beneath said wire, a movable element, a pair of formers mounted for limited rotation about a common axis and adapted to be actuated by the first motion of said movable element for bending said wire section over said anvil to form staple legs in the end portions thereof, means for withdrawing said anvil from beneath said wire after said legs have been formed, and a pair of hammers mounted for limited rotation about the axis of said formers and adapted to be actuated by further movement of said movable element to drive said legs into the sides of said box corner.

2. A stapling head for sequentially forming a staple from a continuous wire and driving said staple around a box corner which comprises, a frame cut away to receive said box corner, means on said frame for positioning a section of said wire across the apex of said corner, means for severing said wire, a movable anvil carried by said frame and adapted to extend beneath said wire, a pair of movable drivers, means actuated upon movement of one of said drivers to form bends adjacent the ends of said staple section, said bends being directed toward the sides of said corner, means for withdrawing said anvil from beneath said wire section, means actuated upon movement of the other of said drivers to bend the intermediate portion of said wire section around said apex and simultaneously drive said bends into the sides of said box corner, and a pair of clinching blocks each having a plurality of parallel clinching guide recesses therein disposed at an acute angle with respect to the plane of said staple.

3. A stapling head for sequentially forming a staple from a continuous wire and driving said staple around a box corner which comprises, a frame cut away to fit said box corner, means on said frame for positioning a section of said wire across the apex of said corner, means for severing said wire, a movable anvil carried by said frame and adapted to extend beneath said wire, a movable element, a pair of formers journaled for rotation about a hub formed on said frame and adapted to be actuated by the first motion of said movable element to bend said wire section over said anvil to form staple legs in the end portions thereof, means for withdrawing said anvil from beneath said wire section after said legs have been formed, a pair of aligned spindles journaled in said frame, and a hammer mounted on each of said spindles and adapted to be rotated therewith upon further movement of said movable element so as to drive said legs into the sides of said box corner.

4. In a stapling head, a pair of segmental formers pivoted about a common axis, each of said formers having a peripheral flange, and a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers.

5. In a stapling head, a pair of segmental formers pivoted about a common axis, each of said formers having a peripheral flange, and a fixed wall in sliding contact engagement with the outer peripheral surface of one of said formers and having an inlet feed opening therethrough

at a point in the path of movement of said former during operation thereof.

6. In a stapling head, a pair of pivoted segmental formers adapted for rotation into temporary sustained clamping engagement against an article to be stapled, an anvil cooperating with said formers during such rotation thereof to shape a staple, and hammer means for driving said staple into such article during such temporary sustained clamping engagement of said formers against said article.

7. In a stapling head, a pair of segmental formers pivoted about a common axis, each of said formers having a peripheral flange, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers, and means for sequentially rotating said formers and said hammers against an article to be stapled and holding said formers against such article until operation of said hammers takes place.

8. In a stapling head, a pair of segmental formers pivoted about a common axis and normally maintained with their leading or operative edges in substantial alinement, hammer means, a wall adjacent the outer peripheral surface of one of said formers, a feed opening through said wall in the path of movement of said former to permit of the insertion of staple wire into staple forming position with respect to said formers and hammer means, means for sequentially actuating said formers and hammer means into engagement with an article to be stapled and means for introducing an anvil into operative cooperation with said formers during actuation of said formers.

9. In a stapling head, a pair of segmental formers pivoted about a common axis, each of said formers having a peripheral flange, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers, a fixed wall in sliding contact engagement with the outer peripheral surface of one of said formers and having an inlet feed opening therethrough at a point in the path of movement of said former during operation thereof, means for sequentially rotating said formers and said hammers in the direction of an article to be stapled and means for introducing an anvil intermediate the paths of movement of said flanges during rotation of said formers only.

10. In a stapling head, a pair of segmental formers pivoted about a common axis and normally maintained with their leading or operative edges in substantial alinement, each of said segmental formers including a peripheral flange with a groove extending across the leading or operative end of said flange, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying with the peripheral edges thereof in sliding engagement with the peripheral flanges of said formers and normally maintained with their leading or operative edges in substantial alinement with the leading or operative edges of said formers, a groove in the leading edges of said hammers normally in alinement with the groove in the leading end of each flange, a wall

adjacent the outer peripheral surface of one of said formers, a feed opening through said wall in approximate alinement with the groove in the leading ends of the flanges and hammers to permit of the insertion of staple wire into staple forming position with respect to said formers and hammers, means for sequentially rotating said formers and hammers into engagement with an article to be stapled and means for introducing an anvil intermediate the paths of movement of said flanges during rotation of said formers only.

11. In a stapling head, a pair of segmental formers pivoted about a common axis and normally maintained with their leading or operative edges in substantial alinement, each of said segmental formers including a peripheral flange with a groove along the inner junction of said flange with said former, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers and normally maintained with their leading or operative edges in substantial alinement with the leading or operative edges of said formers, a bead on the peripheral edges of said hammers engaging the groove in said flanges, a wall adjacent the outer peripheral surface of one of said formers, a feed opening through said wall at a point in the path of movement of said former to permit of the insertion of staple wire into staple forming position with respect to said formers and hammers, means for sequentially rotating said formers and hammers into engagement with an article to be stapled and means for introducing an anvil intermediate the paths of movement of said flanges during rotation of said formers only.

12. In a stapling head, a pair of segmental formers pivoted about a common axis and normally maintained with their leading or operative edges in substantial alinement, each of said segmental formers including a peripheral flange with a groove along the inner junction of said flange with said former and extending across the leading or operative end of said flange, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers and normally maintained with their leading or operative edges in substantial alinement with the leading or operative edges of said formers, a groove in the leading edges of said hammers adjacent the contacted surface of said formers and a bead on the peripheral edges of said hammers engaging the groove in said flanges, a wall adjacent the outer peripheral surface of each of said formers, a feed opening through one of said walls in approximate alinement with the groove in the leading ends of the flanges and hammers to permit of the insertion of staple wire into staple forming position with respect to said formers and hammers, means for sequentially rotating said formers and hammers into engagement with an article to be stapled and means for introducing an anvil intermediate the paths of movement of said flanges during rotation of said formers only.

13. In a stapling head, a pair of segmental formers pivoted about a common axis and nor-

mally maintained with their leading or operative edges in substantial alinement, each of said segmental formers including a peripheral flange with a groove along the inner junction of said flange with said former and extending across the leading or operative end of said flange, a pair of segmental hammers pivoted about the same axis for rotation thereabout independently of said formers, said hammers lying in contacting engagement with said formers with the peripheral edges of said hammers in sliding engagement with the peripheral flanges of said formers and normally maintained with their leading or operative edges in substantial alinement with the leading or operative edges of said formers, a groove in the leading edges of said hammers adjacent the contacted surface of said

formers and a bead on the peripheral edges of said hammers engaging the groove in said flanges, a wall adjacent the outer peripheral surface of each of said formers, a feed opening through one of said walls in approximate alinement with the groove in the leading ends of the flanges and hammers to permit of the insertion of staple wire into staple forming position with respect to said formers and hammers, means for sequentially rotating said formers and hammers into engagement with an article to be stapled, said means holding said formers in engagement with said article until rotation of said hammers occurs, and means for introducing an anvil intermediate the paths of movement of said flanges during rotation of said formers only.

MANUEL S. LOPES, JR.