

April 26, 1938.

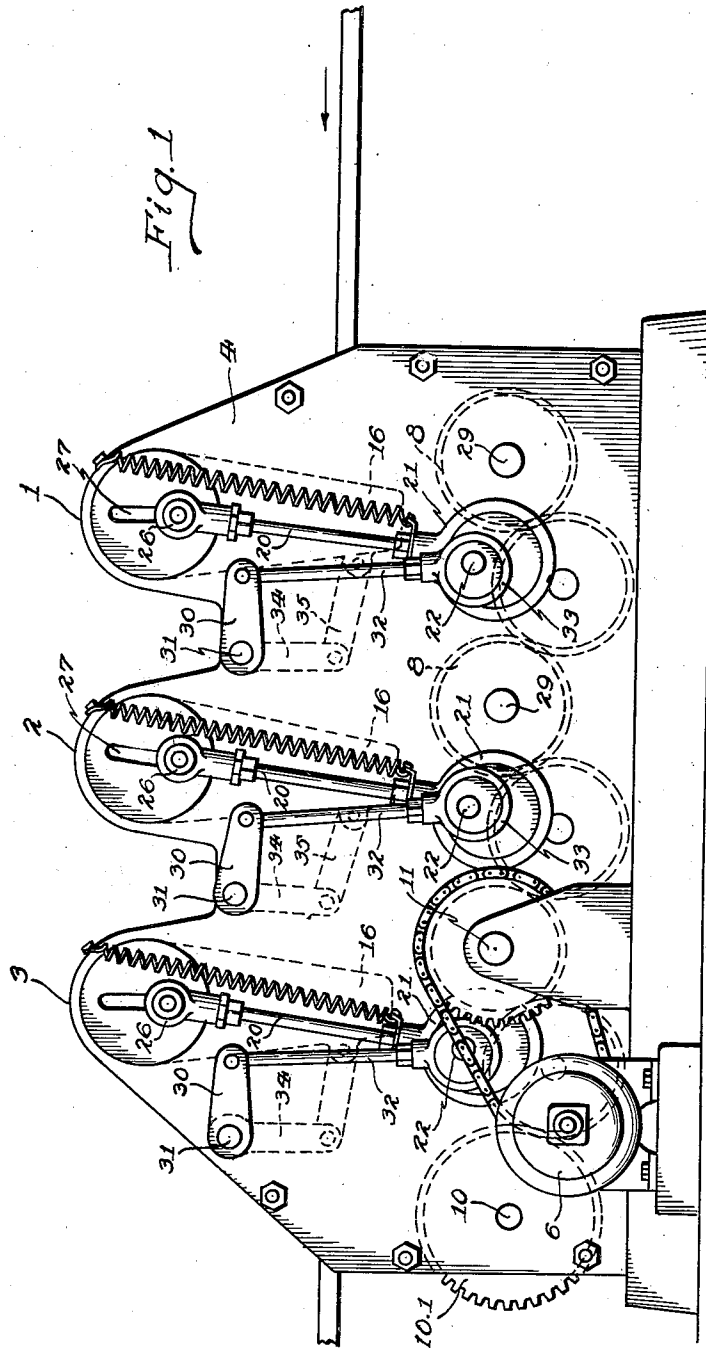
J. R. MILLER

2,115,175

AUTOMATIC STAPLING MACHINE

Filed Oct. 28, 1936

5 Sheets-Sheet 1



Inventor
John R. Miller

by *Remmel, Remmel & Woodworth*
Attys.

April 26, 1938.

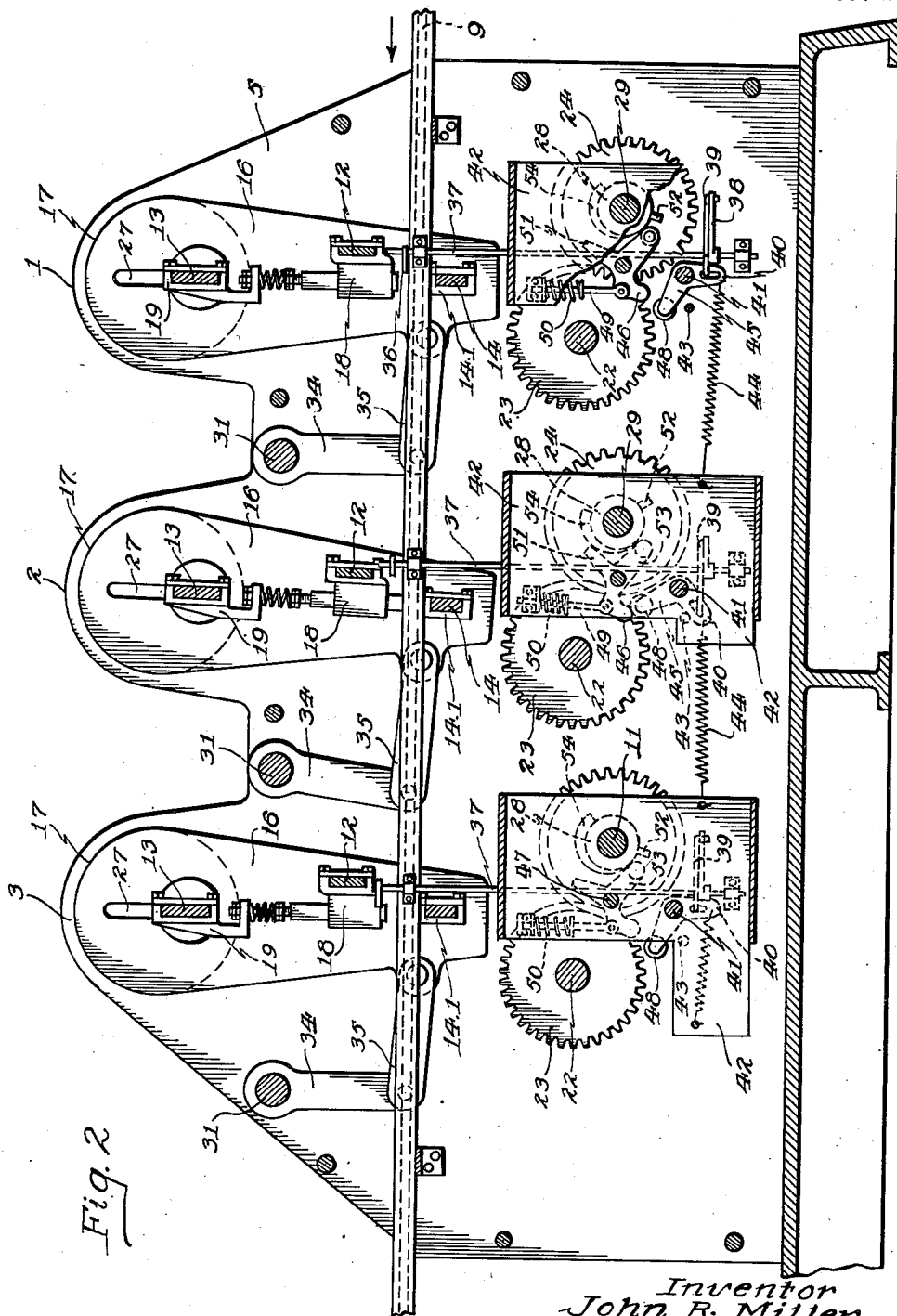
J. R. MILLER

2,115,175

AUTOMATIC STAPLING MACHINE

Filed Oct. 28, 1936

5 Sheets-Sheet 2



Inventor
John R. Miller
Rumrill, Rumrill & Woodworth
Attys.

April 26, 1938.

J. R. MILLER

2,115,175

AUTOMATIC STAPLING MACHINE

Filed Oct. 28, 1936

5 Sheets-Sheet 3

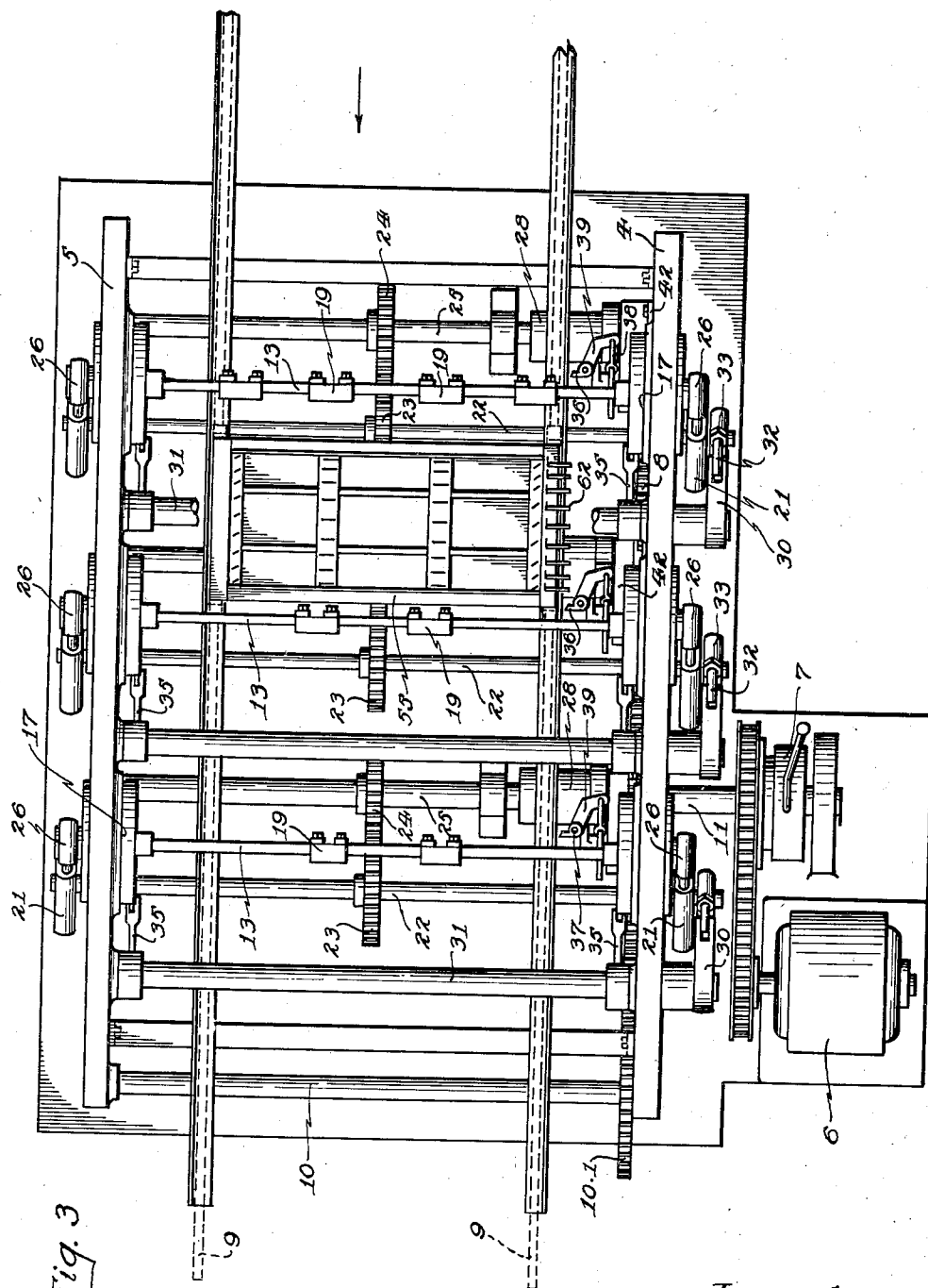


Fig. 3

Inventor
John R. Miller
by *Sumner, Sumner & Woodworth*
his *Attys.*

April 26, 1938.

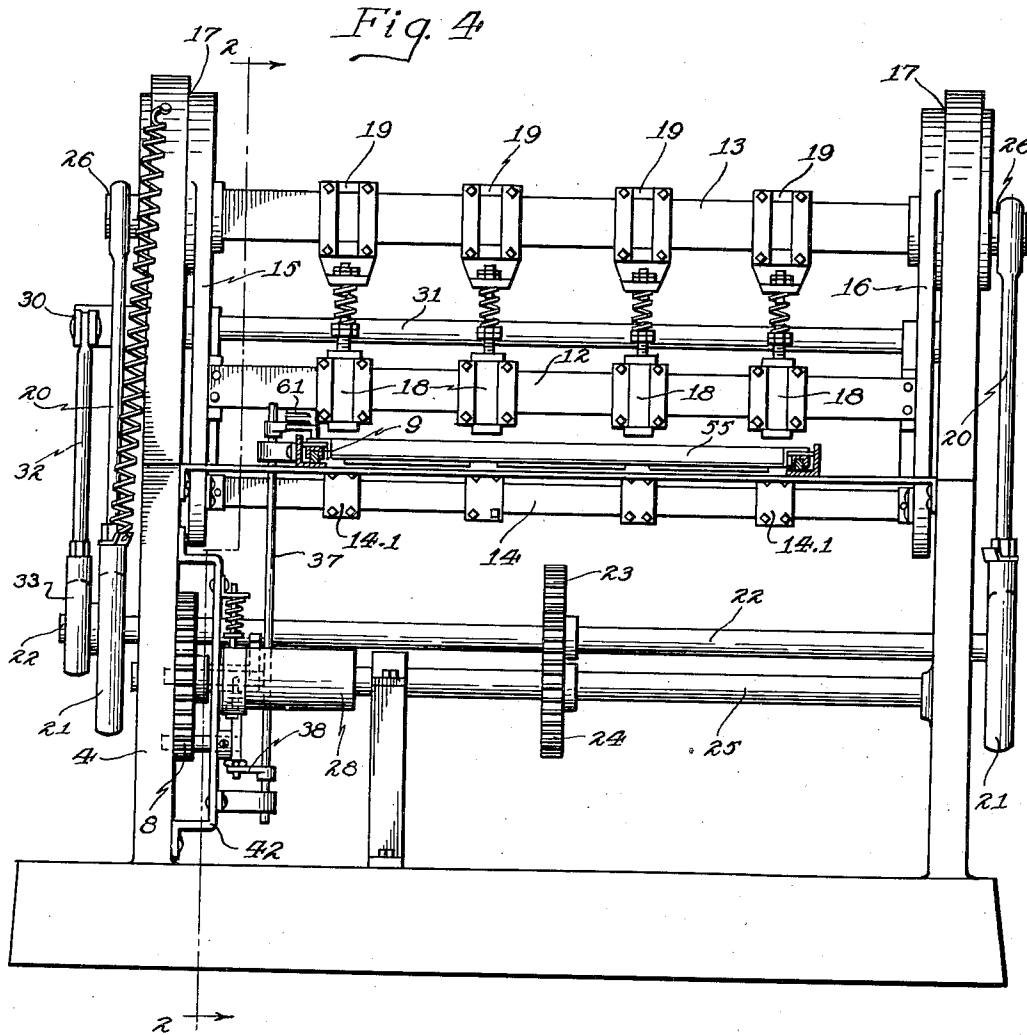
J. R. MILLER

2,115,175

AUTOMATIC STAPLING MACHINE

Filed Oct. 28, 1936

5 Sheets-Sheet 4



Inventor
John R. Miller
by Sumner, Sumner & Woodworth
his Attys

April 26, 1938.

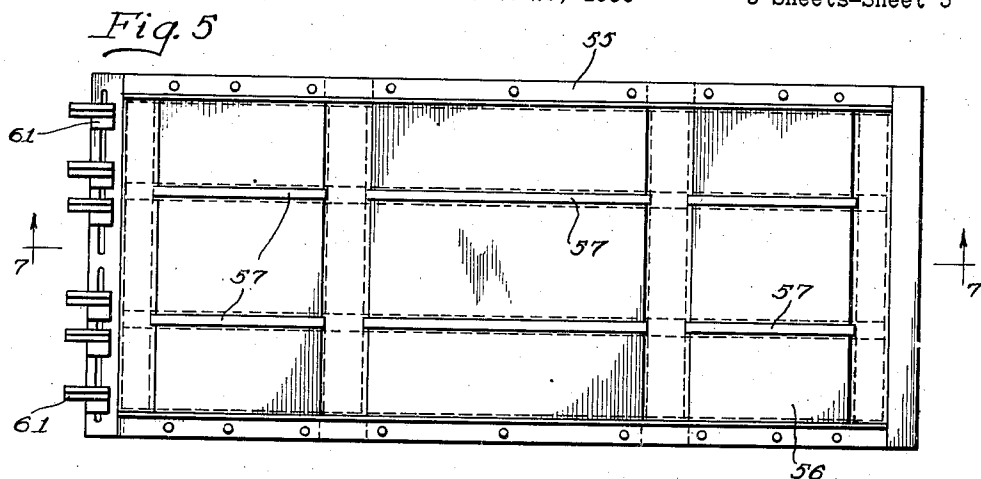
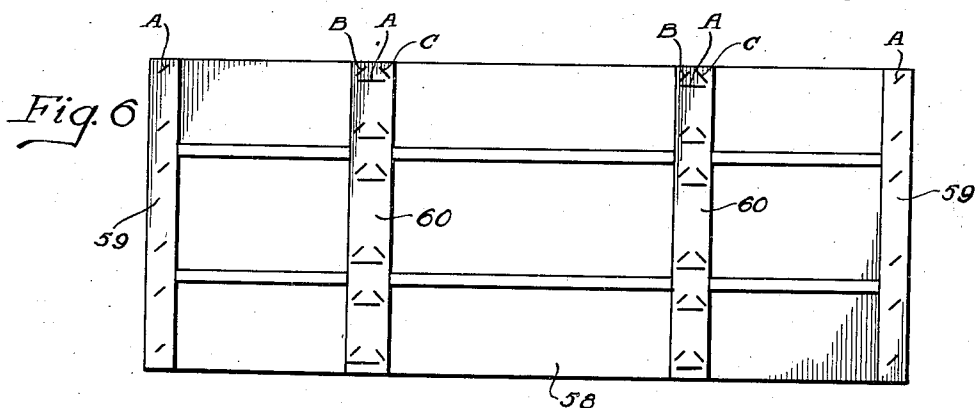
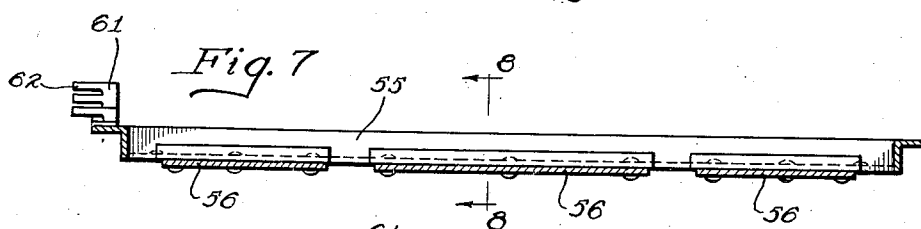
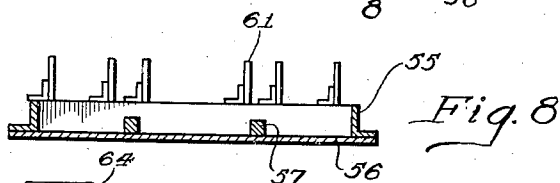
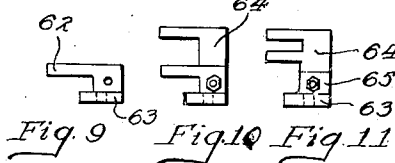
J. R. MILLER

2,115,175

AUTOMATIC STAPLING MACHINE

Filed Oct. 28, 1936

5 Sheets-Sheet 5



Inventor
John R. Miller
by *Penner, Penner & Woodward*
his *Attys.*

UNITED STATES PATENT OFFICE

2,115,175

AUTOMATIC STAPLING MACHINE

John R. Miller, Brewton, Ala.

Application October 28, 1936, Serial No. 107,972

21 Claims. (Cl. 1—8.1)

This invention relates to machines for use in making boxes, crates, box or crate blanks and parts thereof and particularly to automatic stapling machines for fastening together a plurality of box parts.

The main objects of this invention are to provide an improved automatic stapling machine; to provide an improved stapling machine for controllably positioning a staple or fastener in any desired location; to provide such a device for positioning a plurality of staples in close proximity to each other; and in any desired arrangement; to provide an improved combination of stapling mechanisms for controllably positioning a plurality of staples at any desired location in the box parts; to provide an improved combination of selectively operable stapling mechanisms to position staples or fasteners at any desired location in the box parts; to provide an improved controlling means for selectively operating a plurality of stapling or fastening mechanisms; to provide such a controlling means that is independent of the position of the work feeding mechanism of an automatic stapling machine; to provide an improved form in which box parts may be assembled prior to the stapling or fastening operation; to provide an improved combination of assembly form and controlling means for the operation of automatic stapling mechanism; and to provide an improved stapling machine in which a plurality of staple setting mechanisms are selectively controlled and operable by means of an independent form in which box parts are pre-assembled in their proper relationship.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is a side elevation of an improved stapling machine.

Fig. 2 is an enlarged sectional elevation of the machine shown in Fig. 1 taken inside the side frame as on the line 2—2 of Fig. 4.

Fig. 3 is a plan view of the stapling machine.

Fig. 4 is an end elevation of the stapling machine taken from the entering end of the same.

Fig. 5 is a plan view of an improved assembly frame for box parts, the box parts being shown in dotted outline.

Fig. 6 is a plan view of an assembled and fastened box mat illustrating a staple or fastener arrangement obtainable with the improved machine.

Fig. 7 is a sectional elevation of the box pre-assembly frame as taken on line 7—7 of Fig. 5 showing an arrangement of means for controlling

the operation of the stapling mechanisms, the box parts being omitted.

Fig. 8 is a sectional view of the same taken on the line 8—8 of Fig. 7, and

Figs. 9, 10, and 11 are views showing different types of actuating dogs for selective control of the stapling mechanisms.

In the form shown in the drawings the improved stapling machine is of a type designed to produce what is commonly referred to as a box or crate blank having a plurality of separate parts or sections of side material and cleats connected together in cooperable, foldable relationship by means of staples or fasteners which are driven through the cleats and the side material.

In the arrangement shown the box parts are pre-assembled in their proper relationship in a work carrying form or frame and continuously traveling work feeding mechanism is provided for carrying or transporting the assembly frames and the box parts through the stapling machine, the box parts being successively operated upon by a plurality of independently operable stapling or fastener setting mechanisms each of which, according to well-known practice, is arranged to move with the work during the stapling operations and to automatically return to an initial position for the next stapling operation.

The selective operation of the several stapling mechanisms is accomplished by means of a controlling pattern which is carried by the work assembly frame whereby the selective and successive operation of the stapling mechanisms is independent of the operation of the work feeding means, the work feeding means and the stapling mechanisms being co-related only with regard to the distance of travel of the work feeding mechanism during one cycle of operation of the stapling mechanism.

As shown in the drawings the improved stapling machine comprises three independently operable staple or fastener setting mechanisms 1, 2, and 3, arranged in a horizontal series and combined in unitary structure comprising side frames 4 and 5. Power for operating the respective stapling mechanisms is provided from a common source which, in the arrangement shown, is a motor 6 driving through a suitable transmission including a main clutch 7 and a chain of transmission gears 8 which are suitably journaled on the inner side of the side frame 4. A work feeding mechanism comprising a conveyor chain 9 driven through suitable connection, not shown, with a shaft 10, which shaft is constantly driven by the main drive shaft 11 through the power

transmission gears 8 and a gear 10.1 is provided to carry or transport the work to the several stapling mechanisms successively.

The several stapling mechanisms are identical in construction and general arrangement, each receiving its motive power from a respective one of the gears 8 in the power transmission chain, and for that reason the description of the construction details will be confined to one of the units. Duplicate numbers, however, designate like parts in the several stapling units.

Each stapling mechanism itself, in the arrangement shown, is of a type that is well-known in the art and is a unit comprising a fixed stapling head bar 12, a reciprocable driving head bar 13 and a clinch bar or anvil support 14 mounted in a carriage comprising end frames 15 and 16 which in turn are pendulously supported in suitable journals 17 in the stapling machine side frames 4 and 5 respectively, the journals 17 permitting a swinging or pendulous motion of the entire stapling mechanism unit. The stapling head bar 12 provides a support upon which stapling heads 18 may be supported, each stapling head being a separate unit capable of forming a wire staple from wire stock fed thereto by automatic means not shown and driving the formed staple into the box parts.

The stapling heads 18 may be any of several suitable and well-known devices and are therefore not shown in detail. Likewise the wire feeding mechanism is well-known in the art and therefore not shown; and according to usual practice one or more stapling heads together with associated wire feeding mechanisms may be mounted in laterally spaced relation on the stapling head bar 12. Each stapling head 18 is actuated by respective driving means 19 mounted on the driving head bar 13, thus each reciprocation of the driving head bar 13 causes a staple or fastener to be formed and driven by the stapling head 18.

The reciprocation of the driving head bar 13 is accomplished by means of a pair of connecting rods 20 which are operated by means of respective eccentrics 21 fastened to the outboard ends of a drive shaft 22 which, in turn, is driven through gears 23 and 24 from a drive shaft 25. Each connecting rod 20 is connected to a respective end of the driving head bar 13 on a journal 26 and the driving head bar 13 moves in slots 27 formed in the journaled upper ends of the stapling mechanism unit side frames 15 and 16.

The drive shaft 25 is driven through an automatic clutch 28 which serves to connect and disconnect the drive shaft 25 with a continuously rotated shaft 29 to which one of the gears 8 of the power transmission is secured. Thus, when the clutch 28 is engaged to connect the shafts 29 and 25, the driving head bar 13 will be caused to reciprocate one cycle for each revolution of the drive shaft 25, the gears 23 and 24 between the eccentric driving shaft 22 and the shaft 25 being of the same size or pitch diameter.

The means for rocking or pendulously oscillating each stapling mechanism is shown in Figs. 1 and 2 and comprises a crank arm 30 secured on the end of a rocker shaft 31 and connected by means of a connecting rod 32 to an eccentric 33 mounted on the eccentric drive shaft 22 alongside the eccentric 21 which reciprocates the driving head bar 13.

The rocker shaft 31 is then connected to the side frames 15 and 16 of the respective stapling mechanism by means of a crank 34 secured to a

rocker shaft 31 and a link 35 connecting the end of the crank 34 with the side frames.

The relative positions of the eccentrics 33 and 21 on the eccentric drive shaft 22 are fixed so that during the staple forming and driving operation the stapling mechanism will swing in the journals 17 in the direction in which the work is traveling, thus permitting a continuous operation of the work feeding mechanism without the necessity of pauses during the stapling operation. The theory purpose and operation of the swinging or shiftable stapling mechanism is old and well-known in the art and therefore will not be further described.

As heretofore noted each of the stapling mechanisms of the improved stapling machine is independently operable and independently controlled so that the several stapling mechanisms may be selectively operated.

Each stapling mechanism is provided with a clutch 28 for connecting and disconnecting the respective drive shaft 25 with the respective constantly driven shaft 29 and each clutch 28 is controlled by a respective trip mechanism that in turn, is actuated by controlling means adjacent the path of the work feeding mechanism.

A trip mechanism and controlling means for operating clutch 28 is shown in Figs. 2, 3, and 4 and comprises a trip finger 36 fixed on a rotatable shaft 37 and arranged to project toward the path of the work feeding mechanism so as to be engageable with actuating means carried by the work feeding mechanism. The shaft 37 extends downwardly at the side of the stapling machine and carries a crank arm 38 fixed at its lower end, which crank arm is connected by a trip link 39 to one arm 40 of a bell-crank-shaped stop lever pivotally mounted on a stud 41 carried by a supporting plate 42. The supporting plate 42 is mounted on the stapling machine side frame as shown in Fig. 4.

The arm 40 of the stop lever is normally held against a stop 43, projecting from the plate 42, by means of a spring 44 which serves to hold the stop lever and the trip link normally retracted. The other arm 45 of the stop lever is arranged to normally project into the path of an arm 46 of a three-armed lever pivotally mounted on a stud 47 and when in normal position a roller on the arm 46 contacts with a roller 48 on the arm 45 and arrests the movement of the arm 46 which is normally pressed toward the arm 45 by means of a link 49 under the action of a spring 50. The three-armed or triple lever, of which arm 46 forms a part, has a second arm 51 which normally projects into the path of a finger 52 of the clutch release member of the clutch 28 mounted on the shaft 29 which is driven by the respective gear 8 fixed thereon and meshing with the stapling machine transmission so as to be constantly rotated when the stapling machine is in operation.

The clutch 28 is preferably a so-called "roller clutch" of known construction and unnecessary to describe herein, except in its particular relation to the working of this machine. The finger 52 of the clutch release member protrudes from the body of the clutch in a position to be engaged by the arm 51 of the triple lever. The clutch 28 is normally disengaged from the shaft 29 by contact of its control finger 52 with the arm 51, and the triple lever is held in this engaged position so long as arm 45 arrests the movement of arm 46. When the finger 52 is moved backward against operating rotation of

the clutch 28 it renders the clutch inoperative by releasing the clutch rollers.

The triple lever having the arms 46 and 51, also has an arm 53 carrying a roller adapted to engage a cam 54 formed on the clutch case. The cam 54, through engagement with the arm 53, automatically returns the triple lever to its original or normal position to stop the clutch after it has completed one revolution. Suitable braking means, well-known in this art and therefore not shown, are also provided to arrest rotation of the clutch when the clutch rollers are released and thus take up any shock due to stoppage of the clutch and parts affected thereby as well as to prevent rebound of the clutch and parts connected therewith.

It will thus be seen that each time the trip lever 36 is actuated the clutch trip mechanism will operate to provide a driving connection, between the continuously rotating shaft 29 and the drive shaft 25, for one complete revolution during which the staple setting mechanism will be operated once or through one cycle to perform a fastening operation, returning at the end of such cycle to its initial or starting position wherein the driving head bar will be positioned at the top of the slots 27 in which it reciprocates.

As indicated in Figs. 3 and 4 the box parts which are to be fastened in assembled positions are fed into the stapling machine in a form or frame 55 which is carried or transported through the stapling machine by the work feeding mechanism chains 9. The form 55 is shown in detail in Figs. 5, 7, and 8 and comprises a rectangular frame on one face of which a plurality of spaced panels 56 are secured to provide a bottom upon which the box parts may rest when they are set into the frame.

In the form shown, the form or frame 55 is arranged for a three-panel box mat made up of a plurality of spaced slats and thus spacing bars or ribs 57 are mounted on the inner side of the panels 56 in order to provide the proper spacing for the several slats which go to make up the box mat or blank. Also the bottom panels 56 are spaced away from the ends of the form 55 and from each other at the location of the transverse cleats comprised in the box mat in order to provide a space into which the anvils 14, carried on the clincher bars 14 may fit to back up the box material at the points where the staples are driven during the stapling operation.

Thus, when the box parts are assembled in the form 55, the slats 58 comprising the box panels are laid first and the end cleats 59 and corner cleats 60 are laid on top of the slats 58. It will be noted that the spacer ribs 57 are of greater height than the thickness of the slats 58 so as to engage the sides of the cleats 59 and 60 and hold them in proper position relative to the slats 58.

As shown in Figs. 5, 7, and 8, the controlling means for actuating the clutch tripper mechanism and hence for controlling the operation of the stapling mechanisms is associated with the box assembly frame or form 55 and comprises a plurality of spaced dogs or lugs 61 adjustably mounted along one side of the frame 55 and so arranged that as the frame 55 is carried or transported through the stapling machine by the work feeding means, as shown in Fig. 3, the controlling dogs 61 will successively and selectively actuate or operate the trip fin-

gers, and hence the clutch controls, of the desired stapling mechanisms.

As indicated by Figs. 5 and 6, the controlling dogs 61 are arranged on the side of the frame 55 so that there will be a dog for each stapling operation of the several stapling mechanisms and these dogs are so spaced and positioned that the selected stapling mechanism will be operated to place or set staples at the desired locations in the box parts, the desired locations for the staples corresponding to the positions of the respective dogs.

As shown in Fig. 2 the trip fingers for the several stapling mechanisms are arranged at different heights above the level of the working bed or the work feeding mechanism. Thus, a dog projecting from the side of the frame 55 at the level of any one of the several trip fingers will actuate or operate that arm only, passing over or under the other trip fingers, as the case may be, while traveling through the stapling machine. Thus, it will be seen that the plurality of dogs 61 may be arranged so that each will operate only the desired stapling mechanism for setting staples in the box parts at its particular relative location and that in this manner the several dogs 61 constitute an operating pattern for controlling the composite operation of the stapling machine as a whole, which pattern is directly associated with the box parts assembly frame and therefore independent of location along the path of the work feeding mechanism and of the particular position of any part of the feeding mechanism relative to the box parts to be fastened.

It will also be seen that any desired sequence or order of operation of the several stapling mechanisms may be had for each individual frame as it is carried through the stapling machine and thus frames for one size and arrangement of box parts may be immediately followed by frames for another size or arrangement of box parts without changing the set-up of the stapling machine so long as the spacing of the staples transversely of the machine for the several box sizes is the same.

For example; box mats of the same length as that shown in Fig. 6 but of varying widths may be made in a single run of but one stapling machine by simply adjusting the operating pattern, or arrangement of dogs, for each frame according to the staple arrangement desired for that frame.

The illustrative box mat shown in Fig. 6 shows a stapling arrangement that with ordinary box making machinery would require three separate machines and hence three feeding operations to be accomplished. However, in the herein described stapling machine all of the staples may be set during one feeding operation. For example; the staples of Fig. 6 indicated by letter A may be set by the stapling mechanism 1 (see Fig. 1); the staples indicated by the letter B may be set by the staple mechanism 2; and the staples indicated by the letter C may be set by the stapling mechanism 3, and thus a closely nested arrangement of staples as shown in the intermediate cleats 60 can be obtained.

It will be noted that in the staple arrangement shown in Fig. 6 that each of the three stapling mechanisms will operate upon substantially the same part of the box mat. Thus the controlling dogs 61 will each be of a type having three projecting fingers 62, as shown in Fig. 7, one for each of the respective stapling mechanism trip fingers 36. The lowermost finger 62 of the controlling dogs will operate the number 1 stapling mechanism, 75

the intermediate finger will operate the number 2 stapling mechanism, and the top finger will operate the number 3 stapling mechanism.

It will be apparent, however, that as desired, the dogs may be arranged so as to operate only selected ones of the several stapling mechanisms for its particular position relative to the box parts. For example, if it is desired that the number 1 stapling mechanism only should position staples at a certain location in the box parts the dog for that location would be of the type shown in Fig. 9. Likewise, if it should be desired that at a certain location in the box parts only the number 1 and number 3 stapling mechanism should operate or only the number 2 and number 3 stapling mechanisms should operate, dogs of the type shown in Figs. 10 and 11, respectively would be employed for that location. Thus, substantially any desired combination or pattern of operations of the several independent stapling mechanisms may be accomplished by merely setting up the proper pattern or arrangement of controlling dogs.

The dog shown in Fig. 9 is constructed as a single unit having a flanged portion 63 for mounting on the frame 55 and a single finger 62. This dog is provided with a bolt hole in its upstanding portion in order to permit bolting on additional finger brackets as in the case of the dog arrangement shown in Fig. 10 wherein an auxiliary finger lug or bracket 64 for controlling the number 3 stapling mechanism is attached to a dog of the type shown in Fig. 9 thereby producing an assembly that will operate the number 1 and number 3 stapling mechanisms only.

The dog shown in Fig. 11 is of the type that would be employed at locations where operation of the number 1 stapling mechanism is not desired and this dog is constructed of a single angle bracket 65 arranged to be mounted on the frame 55 and having attached thereto an auxiliary finger or lug bracket 64 for operating the number 2 and number 3 stapling mechanisms only. It is by the construction of a controlling pattern made up of selected ones of the several types of dogs that any desired selective operation of the several stapling mechanisms can be accomplished.

In the operation of the herein described machine the box-parts assembly trays or frames 55 are placed upon the chains 9 of the work feeding mechanism at the entering end of the machine and are carried into the machine with one of the long sides of the tray leading, the end of the tray on which the controlling pattern is located being positioned at the side of the machine on which the trip fingers 36 of the clutch operating mechanism are located. As before mentioned, the work feeding mechanism is constantly driven and the chains 9 move so that the tray or frame 55 travels through the machine continuously at a uniform rate.

Since each stapling mechanism is independently operable such mechanisms will only operate upon the box parts when they have been respectively actuated by the control pattern associated with the particular assembly frame carrying the parts to be operated upon. Thus, a single frame may be sent through the machine, or a plurality of frames may follow each other edge to edge, or a series of frames may be spaced apart haphazardly according to the skill or convenience of the operator without danger of unwanted operation of the stapling mechanisms.

The first step before the actual stapling operations are commenced is to set up the stapling

machine by arranging the desired stapling heads 18 and their associated driving heads 19 on the stapling head bars 12 and driving head bars 13 respectively. This step in the operation of stapling machines is well-known in the art and will therefore not be further described except to mention that the stapling heads, and associated driving heads, for each respective stapling mechanism are located transversely of the machine so as to operate upon the box parts at the desired places.

For example, in the arrangement herein illustrated the number 1 stapling mechanism will carry four stapling heads to take care of the four rows of staples indicated by the letter A in Fig. 6. In many ordinary box constructions the necessary staples can be set by a single stapling mechanism. However, in the box blank illustrated in Fig. 6 it is necessary to place three staples in very close proximity to each other, at each of the 20 stapling points in the intermediate cleats 60, which could not be accomplished by a single stapling mechanism for the reason that the stapling heads necessary to set each group of three staples could not be positioned so closely together on one stapling head bar. Therefore the number 2 and number 3 stapling mechanisms must be set up with the proper stapling heads to set the staples indicated by the letters B and C respectively. Thus, by means of the combined machine herein described and illustrated any arrangement of staples that might be desired may be had no matter how closely located the staples might be relative to each other.

The second step in preparing for the stapling operation is to provide the trays or frames 55, suitably constructed and arranged to hold the several box parts in proper relation to each other, and to arrange the staple locating or positioning pattern on each of the frames. The staple positioning pattern is constructed by mounting on the end of each frame 35 the proper dogs 61 having actuating fingers 62 so positioned vertically as to operate the respective controlling means or trip fingers of the selected stapling mechanisms. A dog 61 will be provided for each row of staples, transversely of the machine, and such dog will carry proper fingers 62 positioned to actuate the trip fingers 36 of the selected ones of the several stapling mechanisms.

As the frame or assembly form 55 travels through the stapling machine under the influence of the work feeding mechanism, the fingers of the controlling dogs 61 will trip any of the several trip fingers 36 that happens to be in their path, and each time a trip finger 36 is engaged the respective stapling mechanism will be operated.

With reference to Figs. 2 and 3 as the tray 55 is fed through the stapling machine, the controlling fingers 62 will each actuate the trip fingers 36 that happens to be in its path or at its particular level. The trip fingers 36 obstruct the passage of the controlling fingers 62 and must be forced back to clear the way. This is accomplished by forming each trip finger 36 with a cam surface on its end so that as the fingers 62 engage the same, the trip finger 36 will be forced back angularly and thus rotate the shaft 37 to which it is secured. When the trip finger 36 is thus forced to move and rotate the shaft 37, the crank arm 38 secured on the lower end of the shaft will likewise be moved thus shifting the link 39 so as to rock the bell-crank-shaped lever on its pivot 41 and move the arm 45 and its roller 48

out of the path of the arm 46. When the arm 46 is released by the movement of the arm 45, the triple lever will turn on its pivot under the action of the spring 50 and the link 49 sufficiently to cause the arm 51 to release the clutch member 52 which causes the clutch 28 to revolve with the shaft 29 which is continuously in motion. During such revolution of the clutch 28, the cam 54 thereon engages the lower arm 53 of the triple lever and returns it to a position where its arm 51 will again engage the finger 52 and disengage the clutch and stop the rotation of the drive shaft 25 and connected parts.

The trip finger 36 will be released from its actuating dog finger 62 before the stapling operation has taken place and thus the crank 38 and link 39 will be free to return to their normal position under the action of the spring 44 so that the arm 45 and its roller 48 will return to their normal position. This will arrest arm 46, its having been forced back to its normal position by the cam 54, and thus prevent a second revolution of the clutch 28, the clutch stopping when the clutch member 52 engages the arm 51 of the triple lever. This completes the cycle of operation of the trip mechanism and of the stapling mechanism, but, such operation may be repeated indefinitely once for each controlling dog finger that is located so as to engage the respective trip finger 36. Thus the stapling mechanism operates only when and whenever its respective trip finger 36 is actuated by a controlling dog finger 62.

Upon release of the clutch 28 and consequent rotation of the drive shaft 25, the eccentric drive shaft 22 will be rotated so as to operate the eccentrics 21 and 33. Thus, as the shaft 22 is rotated, the consequent rotation of the eccentrics 21 and 33 will cause simultaneous operation of the stapling head driving bar 13 and the crank mechanism 30, 34, and 35 which oscillates the stapling mechanism as the driving head bar reciprocates, the eccentrics 21 and 33 being so located angularly relative to each other that the stapling mechanism will be caused to move with the box parts being operated upon during the staple driving and clinching operation, thus permitting uninterrupted travel of the work feeding mechanism. This feature is also old and well-known in the art and need not be further described.

The work feeding mechanism may be any of several well-known constructions and the chain 9 may be of any suitable type for supporting and transporting the frames 55 through the machine. Ordinarily the chains 9 will be provided with spaced lugs, not shown, for positively engaging the rearward edge of the frames 55 so that they will move at a uniform rate through the machine without any danger of slippage relative to the work feeding mechanism.

The construction and arrangement of the working bed of the feeding mechanism in front of the entering end of the machine and beyond the leaving end of the machine is not shown or described since any suitable arrangement may be employed. Ordinarily sufficient working bed in front of the machine will be provided to permit the setting of the frames onto the feeding mechanism chains, the frames 55 having the box material placed thereon before being set on the chains or after being set on the chains as may be desired. At the leaving end of the machine the chains 9 may drop immediately for their return travel to the entering end of the machine, discharging the

frames 55 onto any suitable table or other receiving arrangement.

The main advantages of my improved stapling machine arrangement and combination lies in the fact that a closely set arrangement of staples in box parts, that would ordinarily require several stapling machines and operating runs, may be accomplished with a single machine and a single run. Also a single machine may be employed, without change in stapling head set-up for fastening the parts of several sizes of boxes requiring different staple spacing arrangements in a single run and regardless of the order in which the frames carrying the several box sizes follow each other. Another advantage of my improved combination lies in the arrangement whereby the operation of the respective stapling mechanisms is independent of location of the box parts relative to the work feeding mechanism, the work feeding mechanism and the stapling mechanism being co-related only with regard to the distance of travel of the feeding mechanism during one cycle of stapling operation.

Another advantage of my improved construction lies in the reduction of operating cost that is obtained. Thus, with the present arrangement 15 or 20 frames for a particular box size is all that may be required and after a run of boxes or box mats has been completed these frames may be stored for service on a repeat order. In the ordinary arrangement of stapling mechanisms the controlling means for operating the stapling mechanism is associated either directly with the machine or with the work feeding mechanism and consequently must be changed and rearranged for each change in size of box that is being run through the machine. This is a costly and time consuming procedure and is particularly so with regard to frequent repeat orders. With my improved arrangement the only parts that must be "set up" on the machine are the stapling heads, the driving heads and the anvils for clinching the driven staples. The controlling pattern for controlling the selective operation and sequence of operations of the stapling mechanisms is independent of the machine and associated with the assembly forms or frames 55.

Another advantage of my improved arrangement is that the frames may be fed to the machine according to the will of the operator and with any haphazard spacing between the frames, without danger of the stapling mechanism operating without box parts being properly positioned beneath the stapling heads. In ordinary stapling machines where the controlling means is associated with the work feeding mechanism the box parts must be assembled on the work feeding mechanism in exact order and without any blank spaces since the operation of the stapling mechanism depends upon the position of the work feeding mechanism rather than the location of the box parts in the machine.

Although but one specific embodiment of my invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A stapling machine comprising a continuously traveling work feeding means, a plurality of staple setting mechanisms arranged successively in the direction of travel of said work feeding means, power driven means arranged for operating said staple setting mechanisms, and

means to actuate said staple setting mechanisms selectively as work is progressed through said stapling machine by said work feeding means.

2. A stapling machine comprising a continuously traveling work feeding means, a plurality of independently operable staple setting mechanisms arranged successively in the direction of travel of said work feeding means, power driven means arranged for operating said staple setting mechanisms, means to drive said work feeding means at a constant speed, and means to actuate said staple setting mechanisms selectively as work is progressed through said stapling machine by said work feeding means.

3. A stapling machine comprising a continuously traveling work feeding means, a plurality of staple setting mechanisms arranged successively in the direction of travel of said work feeding means, said staple setting mechanisms each comprising a laterally adjustable stapling head, power driven means arranged for operating said staple setting mechanisms, and means to actuate said staple setting mechanisms individually and selectively as work is progressed through said stapling machine by said work feeding means.

4. A stapling machine comprising a continuously traveling work feeding means, a plurality of independently operable staple setting mechanisms arranged successively in the direction of travel of said work feeding means, said staple setting mechanisms each comprising a laterally adjustable stapling head, power driven means arranged for operating said staple setting mechanisms, means to drive said work feeding means at a constant speed, and means to actuate said staple setting mechanisms selectively as work is progressed through said stapling machine by said work feeding means.

5. A stapling machine comprising a continuously traveling work feeding means, a plurality of independently operable staple setting mechanisms arranged successively in the direction of travel of said work feeding means, power driven means arranged for operating said staple setting mechanisms, means to drive said work feeding means at a constant speed, means to actuate said staple setting mechanisms respectively, and means carried by said work feeding means arranged to selectively operate said actuating means.

6. A stapling machine comprising a continuously traveling work feeding means, a plurality of independently operable staple setting mechanisms arranged successively in the direction of travel of said work feeding means, power driven means arranged for operating said staple setting mechanisms, means to drive said work feeding means at a constant speed, means to actuate said staple setting mechanisms respectively, and a pattern carried by said work feeding means arranged to operate said actuating means selectively.

7. A stapling machine comprising a continuously traveling work feeding means, a plurality of independently operable staple setting mechanisms arranged successively in the direction of travel of said work feeding means, power driven means arranged for operating said staple setting mechanisms, means to drive said work feeding means at a constant speed, means to actuate said staple setting mechanisms respectively, and an adjustable pattern carried by said work feeding means arranged to selectively operate said actuating means and at respectively predetermined intervals.

8. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples into box parts, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, and staple positioning means to operate said staple controlling means selectively.

9. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples into box parts, work feeding means arranged to feed box parts to said staple setting mechanisms successively, and means to control the location of staples at predetermined points in the box parts comprising respective controlling members for said staple setting mechanisms, and staple positioning means to operate said controlling members selectively.

10. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples into box parts and each comprising a group of stapling heads, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, and staple positioning means to operate said staple controlling means selectively.

11. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples into box parts and each comprising a simultaneously operable group of stapling heads, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, and staple positioning means to operate said staple controlling means selectively.

12. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples into box parts and each comprising a group of laterally adjustable stapling heads, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, and staple positioning means to operate said staple controlling means selectively.

13. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples in box parts, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, a box parts assembly frame carried by said work feeding means, and staple positioning means on said frame to operate said staple controlling means selectively.

14. A machine for use in making boxes, crates and the like comprising, in combination, a plurality of staple setting mechanisms operable to drive staples in box parts, work feeding means arranged to feed box parts to said staple setting mechanisms successively, staple controlling means arranged to actuate said staple setting mechanisms respectively, a box parts assembly frame carried by said work feeding means, and a plurality of adjustable staple positioning means

on said frame to operate said staple controlling means selectively.

15. The combination with a stapling machine having trip means controlling the operation of staple setting mechanism, and work feeding means for carrying parts to be stapled through said machine, of a separate assembly frame removably carried by said work feeding means for holding said parts to be stapled in proper relation to each other, and a plurality of adjustable staple positioning members on said frame arranged to engage said trip means as said frame is carried through said machine.

16. The combination with a stapling machine having a plurality of staple setting mechanisms, respective trip means for controlling the operation of said staple setting mechanisms independently, and work feeding means for carrying parts to be stapled through said machine, of a separate assembly frame removably carried by said feeding means for holding said parts to be stapled in proper relation with each other, and a plurality of adjustable staple positioning members on said frame arranged to engage said trip means selectively as said frame is carried through said machine.

17. The combination with a stapling machine having a plurality of staple setting mechanisms, respective trip means for controlling the operation of said staple setting mechanisms independently, and work feeding means for carrying parts to be stapled through said machine, of a separate assembly frame removably carried by said feeding means for holding said parts to be stapled in proper relation with each other, and a predetermined staple positioning pattern member mounted on said frame and arranged to actuate said trip means selectively as said frame is carried through said machine.

18. A box parts assembly form for carrying box parts through an automatic stapling machine, comprising a frame having means therein for supporting a plurality of box parts and holding the same in predetermined relation to each other, and a staple position control pattern

mounted on one side of said frame, said pattern comprising individually adjustable and interchangeable actuating members adapted to operate the control mechanism of a stapling machine and located relative to said frame according to predetermined places in said box parts where staples are to be set.

19. A box parts assembly form for carrying box parts through an automatic stapling machine, comprising a frame having means therein for supporting a plurality of box parts and holding the same in predetermined relation to each other, and a staple position control pattern mounted on one side of said frame, said pattern comprising a plurality of individual horizontally adjustable and vertically variable actuating members adapted to operate the control mechanism of a stapling machine and located relative to said frame according to predetermined places in said box parts where staples are to be set.

20. A stapling machine comprising a continuously traveling work feeding means, a plurality of staple-setting mechanisms arranged successively in the direction of travel of said work-feeding means, power-driven means arranged for operating said staple-setting mechanisms, and means to actuate said staple-setting mechanisms individually as work is progressed through said stapling machine by said work-feeding means.

21. A box parts assembly form for carrying box parts through an automatic stapling machine, comprising a frame having means therein for supporting a plurality of box parts and holding the same in predetermined relation with each other, a staple-position control pattern mounted on said frame, said pattern comprising individually adjustable actuating members adapted to operate the control mechanism of a stapling machine and located relative to said frame according to predetermined places in said box parts where staples are to be set, and said actuating members having vertically spaced laterally projecting actuating fingers.

JOHN R. MILLER. 45