F. L. MacKENZIE.

MACHINE FOR INSERTING FASTENINGS.

APPLICATION FILED JUNE 23, 1910.

1,016,947.

Patented Feb. 13, 1912.

2 SHEETS—SHEET 1.

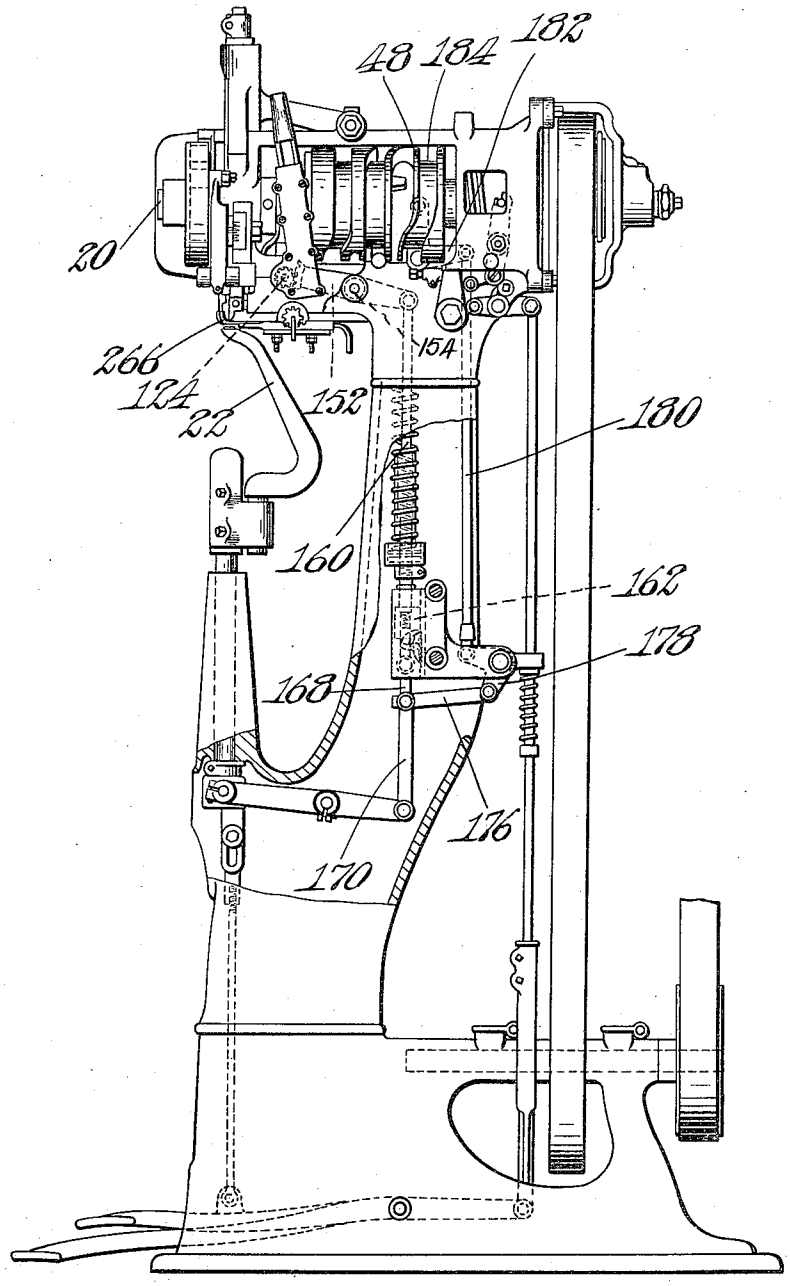

Fig. 1.

WITNESSES:

Elizabeth C. Coupe

M. Louise Steintermann

INVENTOR

Fred L. MacKenzie

by his Attorney

Nelson W. Howard

F. L. MacKENZIE.

MACHINE FOR INSERTING FASTENINGS.

APPLICATION FILED JUNE 23, 1910.

1,016,947.

Patented Feb. 13, 1912.

2 SHEETS—SHEET 2.

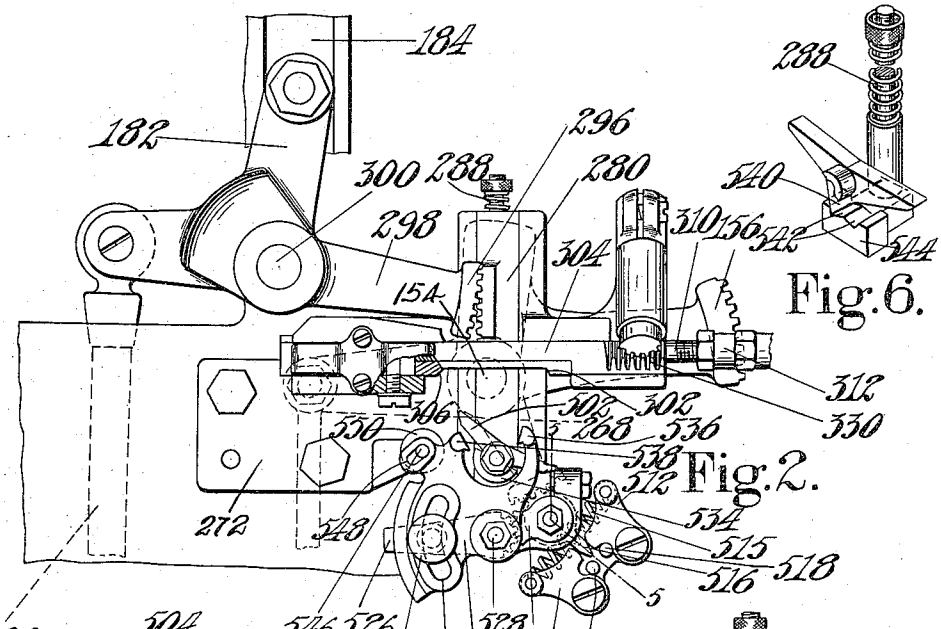

Fig. 6.

Fig. 2.

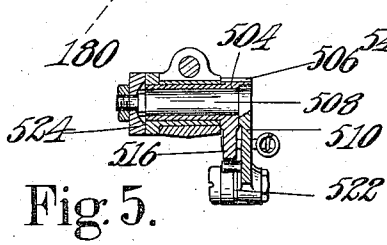

Fig. 5.

Fig. 4.

Fig. 3.

WITNESSES.

Elizabeth C. Coupe

M. Louise Steuternann

INVENTOR.

Fred L. MacKenzie

By his Attorney,

Nelson W. Howard

UNITED STATES PATENT OFFICE.

FRED L. MacKENZIE, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR INSERTING FASTENINGS.

1,016,947. Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed June 23, 1910. Serial No. 568,487.

To all whom it may concern:

Be it known that I, FRED L. MacKENZIE, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Machines for Inserting Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for inserting fastenings and particularly to a machine for inserting fastenings which comprises mechanism for automatically controlling the selection of the fastenings to be inserted whereby the fastenings may be suited to some characteristic or characteristics of the work. Controlling mechanism of this type is usually adapted to provide, or to select from a plurality of sources of supply, a fastening of a length suited to the thickness of the work to be operated upon, and an object of the invention is to provide improved mechanism for this purpose which will insure a change from one length of fastening to another for slight variations upon either side of a critical thickness for which the mechanism has been set.

Another object of the invention is to provide a mechanism for the purposes above pointed out which will be sensitive and yet positive in operation, and which will be so related to the other mechanisms that its operation will not interfere with the operations of said mechanisms nor extend the time required for a complete fastening inserting cycle of operations.

The invention is herein shown as embodied in a machine for inserting fastenings of the type disclosed in the co-pending application of George Goddu, Serial No. 476,649, filed February 8, 1909, machines of this type being known to the trade as "loose nailing machines". Moreover the invention is herein shown as constituting an improvement upon the mechanism for automatically shifting a double raceway in accordance with variations in the thickness of the work which is disclosed in said co-pending application, although it will be understood that many of the novel features of construction and operation herein disclosed are susceptible of wide application.

The automatic raceway shifting mechanism of the co-pending application comprises a part which is set to shift the raceway from long nail position to short nail position, or vice versa, in accordance with changes in the thickness of the work from one side to the other of a predetermined critical thickness. This part may conveniently comprise a double pawl pivoted upon a reciprocating carrier and arranged to be moved by said carrier from a position in which it coöperates at times with a pawl tipper, whereby it is tipped from one operative position into the other, to a second position in which it coöperates with other mechanism to shift the raceway in the desired direction.

In the construction shown in the co-pending application, the pawl tipper is operatively connected with work thickness gaging means and is moved into its different tipping relations to the pawl as the said gaging means registers variations in the thickness of the work from one side to the other side of the aforementioned critical thickness. Difficulty has been experienced with this construction, however, in securing uniformity of the nail selecting operation when the variations in the thickness of the work in the region of the critical thickness have been gradual.

An important object of the invention, therefore, is to improve the construction of the co-pending application by providing improved means for effecting the tipping of the double pawl from one shifting position to the other as the work thickness gaging means registers the required variations in the thickness of the work, and particularly to provide means for effecting the nail selecting change in the relationship of the parts at the desired times which shall be sensitive to slight variations in the region of the critical thickness and yet will be so positive in its operation that the vibrations of the machine, particularly when running at high speed, will not interfere with such operation. To this end the connections between the work thickness gaging means and the pawl tipper preferably comprise means by which the overthrow of the work gaging means in either direction, caused by a marked increase or decrease in the thickness of the work with respect to the critical thickness, may be utilized to initiate the operative movement of the pawl tipper before the critical thickness has come into the field of

operation of the gaging means, said means being preferably so constructed that a variation in the thickness of the work of a predetermined amount within a determined range of thicknesses will effect a movement of the pawl tipper to cause the pawl to be tipped from one nail selecting position to the other.

In one aspect, therefore, the invention may be said to comprise means for automatically controlling the operation of double raceway shifting mechanism in accordance with variations in the thickness of the work constructed to operate for an increase or decrease of a predetermined amount within a determined range of thicknesses.

In another aspect, the invention may be said to comprise, in combination with work thickness gaging means, means for automatically effecting a relative movement of a plurality of fastening guides and a fastening receiver to bring a different guide into fastening delivering relation to said receiver as said gaging means registers a variation in the thickness of the work of a predetermined amount, said means being constructed to operate only for thicknesses gaged within a limited range upon either side of a predetermined critical thickness.

In the illustrated embodiment of the invention the pawl tipper is shown as comprising two pawl engaging members arranged to engage coöperating parts upon opposite sides of the pivot of the pawl, the illustrated tipper being arranged to operate upon the pawl only when the variation in thickness of the work has been such as to move the tipper from one pawl-tipping position to the other. Moreover it will be observed that a comparatively small relative movement of the pawl and its tipper is required to tip the pawl from one nail selecting position to the other and that the tipping takes place upon the upward movement of the pawl, whereby the time required to effect the nail selecting positioning of the pawl and the shifting of the raceway is reduced to a minimum.

Other features and objects of the invention not hereinafter specifically referred to will be apparent upon a consideration of the following description and claims in connection with the accompanying drawings in which,—

Figure 1 is a side elevation of the machine disclosed in the co-pending application, above identified, the invention being applied to the side of this machine opposite to that shown in this figure; Fig. 2 is a side elevation of the raceway shifting mechanism; Fig. 3 is a perspective view of a part of the mechanism shown in Fig. 2; Fig. 4 is a detail side elevation, the parts being arranged to shift the raceway toward the right whereas in Fig. 2 they are arranged to shift the raceway toward the left; Fig. 5 is a detail section on the line 5—5 of Fig. 2, and Fig. 6 is a detail perspective of the means for yieldingly holding the pawl upon either side of its middle position.

The machine of the co-pending application comprises, among other things, a horn 22 for supporting the work, the work being clamped between the horn and a work abutment 266, when the nail is driven, and awl depth controlling mechanism comprising a rod 160 connected to a slide 162 which constitutes a part of the horn release mechanism, a lever 152 and a rock-shaft 124 which carries a pinion with which a segment rack upon one end of the lever 152 engages. After each nail driving operation the horn 22 is lowered, to permit the work to be fed, by means comprising a toggle 168, 170, which is broken and straightened by connections with a cam groove 184 in a cam wheel 48 upon the main shaft 20 of the machine, said connections comprising a bell-crank lever 182, a rod 180, a bell-crank lever 178 and a link 176 connected at one end to the knee joint of the toggle and at its other end to an arm of said bell-crank lever 178. For a more detailed description of these parts and the other parts of the machine with which they coöperate, reference may be had to the co-pending application above referred to.

The mechanism for shifting the double raceway receives its operative movement from an extension of the bell-crank lever 182 and the direction of the shifting is determined by connections with the lever 152, hereinabove referred to as constituting a part of the awl depth controlling mechanism, it being apparent that these two parts operate at the proper times to coördinate the setting and shifting movements of the raceway controlling mechanism with the operations of the other mechanisms which go to make up the machine of the co-pending application. The raceway shifting mechanism comprises an oscillatable member, the angular position of which is determined by the thickness of the work gaged between the horn 22 and the work abutment 266 and the shifting mechanism proper, the operative connections between the oscillatable member and the shifting mechanism proper being intermittently completed. The direction of the operation of the shifting mechanism is determined by the angular position of the said oscillatable member. The parts will now be described in detail.

A slide 280 mounted to reciprocate vertically in a guideway in the bracket 272 at each rotation of the main shaft 20 has pivoted upon its outer face at the lower end a double pawl 502 hereinafter more specifically described. Formed upon the front

face of the slide 280 is a rack bar 294 which is engaged by a segment rack 296 upon an arm 298 connected to the bell crank 182 and turning about the pivot 300 of said bell crank. As the bell crank 182 is rocked with each rotation of the main shaft 20 by the cam groove 184 in the cam wheel 48, the slide 280 will be reciprocated vertically and the pawl 502 will be carried into and out of operative relation to a pawl tipper 500 which is adapted to tip the pawl to one side or the other as the thickness of the work varies, the amount of variation required being preferably from one side to the other of a critical thickness for which the mechanism is set.

The pawl tipper 500 is set to determine the angular position of the double pawl 502 by connections with the arm 268 comprising a sleeve 504 having formed thereon teeth 506 which mesh with the rack teeth upon the arm 268. The arm 268 is connected to the outer end of the rock-shaft 154 to which the lever 152 is also connected. The sleeve 504 is mounted in bearings in the bracket 272 and surrounds a short shaft 508 having attached to its inner end a T-shaped arm 510 upon which are pivoted take-up devices 512 and 514 connected by a spring 515. Depending from the sleeve 504 is a finger 516 which is located between the adjacent edges of the take-up devices 512 and 514. Movement of the take-up devices 512, 514 toward each other is limited by stops 518, 520, respectively. Between the take-up devices and the T-shaped arm 510 are friction washers 522 surrounding the pivots upon which the take-up devices turn.

Connected to the outer end of the shaft 508 is a segment gear 524 which meshes with gear teeth formed upon one arm of a lever 526, pivoted at 528 upon the bracket 272. The pawl tipper 500 is adjustably connected to the other arm of the lever 526 by a set screw 530 passing through an arc-shaped slot 532 formed in the pawl tipper. By loosening the set screw 530 the pawl tipper may readily be adjusted to cause it to effect the shifting of the raceway for a different critical thickness.

The double pawl 502, here shown, has arms which engage the shoulders 302 and 306 upon the slide 304. Attached to or forming a part of the pawl 502 is a semicircular piece 534 providing shoulders upon opposite sides of the pivot of the pawl which cooperate with dogs 536, 538 upon the pawl tipper 500 to effect the turning or tipping of the pawl 502. Depending below the pivot of the pawl 502 and having its point located in the median line between the tips of the two arms of the pawl is a locking member 540 shown in detail in Fig. 6. The point of the locking member 540 enters one or the other of two notches 542 in a coöperating locking member 544 attached to the lower end of a rod 288 which passes down through the center of the slide 280 and is held normally in its uppermost position by a spring. The setting movement of the pawl tipper, or its movement from one pawl tipping position to the other, is limited by a pin 546 which enters a slot 548 in the tipper, the tipper being frictionally held in its adjusted position by a friction washer surrounding the pin 546 and spring pressed into engagement with the under face of the washer.

The connections between the slide 304 and the double raceway 264 comprise, as shown in the co-pending application hereinabove referred to, oppositely threaded rods 308 and 310 connected by an adjusting nut 312, the rod 308 being pivotally connected by the lug 314 upon the side of the double raceway 264. The rod 310 receives in an opening at one end an eccentric pin carried upon the lower end of the rock-shaft 318, mounted in a bearing in the bracket 272, said rock-shaft having formed upon its upper end a pinion with which meshes a segment gear 322 formed upon the end of the rock arm 324 upon the upper end of the rock-shaft 326, also mounted in a bearing in bracket 272 and carrying at its lower end a segment gear 328 which meshes with rack teeth 330 formed upon the slide bar 304, the rack teeth 330 being formed at an inclination to the slide bar 304 and the bearings for the rock-shafts 326 and 318 being correspondingly inclined, this inclination serving to prevent binding when the inclined raceway is moved. The shifting movement of the slide 304 is sufficient to turn the eccentric pin around from one dead center to the other, with respect to the rod 310, so that the raceways are both positively shifted and positively held in the positions into which they have been shifted.

The operation of the double raceway shifting mechanism is as follows: The parts being in the position shown in Fig. 2 in which position the slide 304 is at the left hand limit of its movement, let it be assumed that the stock has varied in thickness enough to require a nail from the other groove in the raceway. In the position of the parts shown in Fig. 2, the stock gaged between the horn 22 and the work abutment 266 has required the shorter of the two lengths of nails provided in the two raceway grooves. Therefore the stock must increase in thickness to effect the change in position of the parts assumed. As the stock gaged between the horn 22 and work abutment 266 increases in thickness, the lever 152 will turn in a clockwise direction in Fig. 2, thus through the arm 268 and the teeth 506 turning the finger 516 in a counterclockwise direction in this figure. As the finger 516 begins to turn about its center of oscillation, it will

push against the overthrow take-up device 512 and tend to turn it about its pivot on the T-shaped arm 510. This take-up device is frictionally held against turning with sufficient force to cause the arm 510 to turn the rock shaft 508 and through its connections with the pawl tipper 500 to turn said tipper about its pivot 528 into the other of its work tipping positions determined by the engagement of the pin 546 with the other end of the slot 548. This movement of the tipper will take place before the take-up device 512 overcomes the friction in its connections with the arm 510. When the finger 516 is moved sufficiently to bring the pawl tipper 500 into its other tipping position, the arm 510 will be prevented from moving farther by reason of its connections with the tipper and therefore further movement of the finger 516 will overcome the friction in the connection between the take-up device 512 and the arm 510 and the take-up device 512 will be turned about its pivot and moved away from the stop 518. As the take-up device 512 is moved about its pivot by the arm 516 the take-up device 514 will be moved about its pivot in the same direction by reason of the spring connection 515 between the two take-up devices, and the take-up device 514 will therefore follow the finger 516 and be kept constantly in engagement therewith until said take-up device engages its stop 520. If the overthrow of the finger 516 should be greater than that required to bring the take-up device 514 into contact with the stop 520, the finger 516 will then move away from the adjacent edge of the take-up device 514. It will thus be seen that whenever there is an overthrow of the finger 516 a portion at least of this overthrow is utilized in causing a change in position of one or the other of the take-up devices 512 and 514, such that when the finger starts to move in the other direction it will start the movement of the pawl tipper into its other tipping position before the critical thickness for which the shifting mechanism has been set is reached. The range of thicknesses upon each side of the critical thickness for which the setting movement of the pawl tipper may be initiated is determined by the stops 518 and 520.

It will be noted that the ratio of the lever arms and the gear ratio in the connections between the take-up devices 512, 514, and the pawl tipper are such that the pawl tipper will be moved from one tipping position to the other for a comparatively small movement of the finger 516,—in other words for a slight change in the thickness of the work in the region of the critical thickness. Having adjusted the work support in its relation to the raceway shifting mechanism so that a long nail will be supplied if the thickness of the work exceeds a predetermined or critical thickness, the small movement of the finger 516 required to shift the pawl tipper from one tipping position to the other will be effective not only for a change of thickness which starts when the critical thickness has been gaged but also for a change of thickness of the same amount which starts upon either side of the critical thickness within limits determined by the position of the gaging means when the finger has moved in one direction far enough not only to tip the pawl but also to cause it to move away from the take-up device 512, after said device has engaged the stop 518, and the position of the gaging means when the said finger has moved in the other direction far enough not only to tip the pawl but also to cause it to move away from the take-up device 514, when said device has engaged the stop 520.

In the preferred embodiment of the invention the amount of variation in the thickness of the work required to move the pawl tipper from one tipping position to the other is so related to the range of thicknesses in which such variation is effective to this end that the said variation will always include the critical thickness.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a machine of the class described, a double raceway having a long nail position and a short nail position, mechanism for shifting said raceway from one position to the other and means for automatically controlling the operation of said mechanism in accordance with variations in the thickness of the work constructed to operate for an increase or decrease of predetermined amount within a determined range of thicknesses greater than that covered by the required amount of increase or decrease.

2. In a machine of the class described, a double raceway having a long nail position and a short nail position, mechanism for shifting said raceway from one position to the other and means for automatically controlling the operation of said mechanism in accordance with variations in the thickness of the work constructed to operate for an increase or decrease of predetermined amount within a determined range of thicknesses greater than that covered by the required amount of increase or decrease, said means having provision for adjustment to different determined ranges of thicknesses.

3. In a machine of the class described, a plurality of fastening guides, a fastening receiver, work thickness gaging means and means for automatically effecting a relative movement of said guides and receiver to bring a different guide into fastening delivering relation to said receiver as said gaging

means registers a variation in the thickness of the work of a predetermined amount, said means being constructed to operate only for thicknesses gaged within a limited range upon either side of a predetermined critical thickness, the total range of thicknesses being greater than that covered by the amount of increase or decrease required to produce the said relative movement.

4. In a machine of the class described, a double raceway carrying long and short nails, work thickness gaging means and means controlled by an increase or decrease in the thickness of the work gaged of a predetermined amount for bringing said raceway into position to deliver a nail of the length required, said means being constructed to operate only for thicknesses gaged within a limited range upon either side of a predetermined critical thickness, the total range of thicknesses being greater than that covered by the amount of increase or decrease required to produce the said relative movement.

5. In a machine of the class described, a double raceway carrying long and short nails, work thickness gaging means and means controlled by an increase or decrease in the thickness of the work gaged of a predetermined amount for bringing said raceway into position to deliver a nail of the length required, said means being constructed to operate only for thicknesses gaged within a limited range upon either side of a predetermined critical thickness, and provision for adjustment to different critical thicknesses, the total range of thicknesses being greater than that covered by the amount of increase or decrease required to produce the said relative movement.

6. In a machine of the class described, a double raceway having a long nail position and a short nail position, and means for automatically shifting said raceway from one position to the other as the work varies in thickness, comprising a part arranged to move from one side to the other of an intermediate position as the thickness of the work increases or decreases, members yieldingly pressed toward each other upon opposite sides of said movable part, one of said members being engaged and moved by said part as it moves in one direction and the other being engaged and moved by said part as it moves in the other direction, stops for limiting the movement of said members toward each other arranged to permit each member to follow said movable part past its intermediate position and means for determining the direction of shift of the raceway having connections to said members whereby it is set by the movement of either member by said part.

7. A machine of the class described, having in combination, a fastening receiver, a plurality of fastening guides movable relatively to said receiver, mechanism for effecting the movement of said guides and means for controlling the direction of movement of said mechanism in accordance with the thickness of the work comprising a double pawl and a pawl tipper, said pawl tipper being provided with separate means for engaging and tipping the pawl in each direction.

8. A machine of the class described, having in combination, a fastening receiver, a plurality of fastening guides movable relatively to said receiver, mechanism for effecting the movement of said guides, means for controlling the direction of movement of said mechanism in accordance with the thickness of the work comprising work gaging means, a double pawl and a pawl tipper, and means for utilizing the overthrow of the work gaging means to initiate the operative movement of the pawl tipper before the critical thickness for which the guide moving mechanism is set comes into the field of operation of the gaging means.

9. In a machine of the class described, a double raceway having a long nail position and a short nail position, mechanism for shifting said raceway from one position to the other and means for automatically controlling the operation of said mechanism in accordance with variations in the thickness of the work constructed to operate for an increase or decrease of predetermined amount within a determined range of thicknesses, the variation in thickness between the limits of said determined range of thicknesses being greater than the amount of increase or decrease required to operate said controlling means.

10. A machine of the class described having, in combination, a fastening-receiving throat, a plurality of raceways shiftable relatively to said throat to bring any one into operative relation thereto and automatic shifting means constructed both to shift said raceways and to hold them positively in the position into which they have been shifted.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRED L. MACKENZIE.

Witnesses:
GEORGE GODDU,
H. DORSEY SPENCER.