

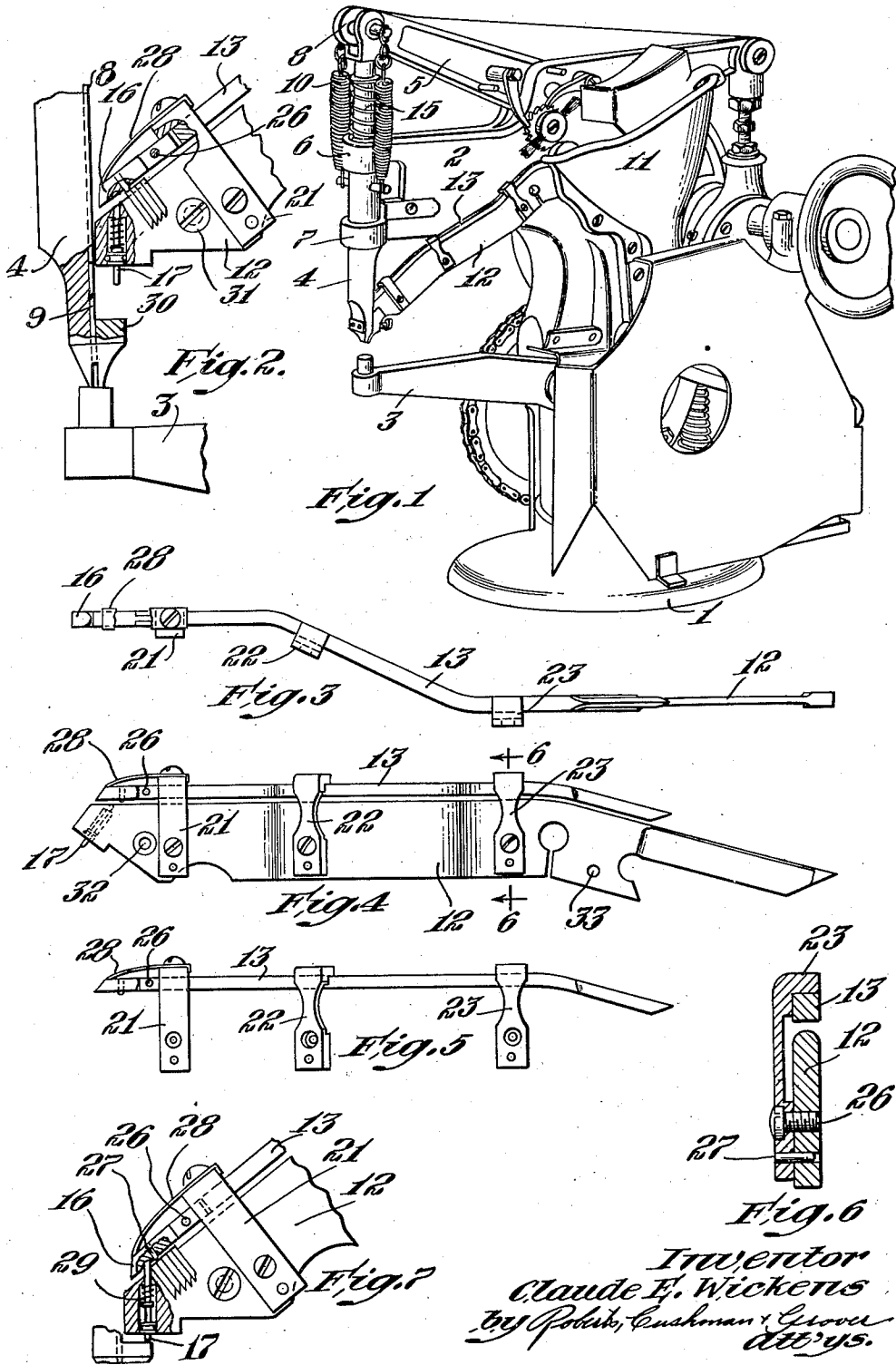
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STAPLING MACHINE

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STAPLING MACHINE

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In stapling machines it is customary to have a staple guide in the form of an inclined bar which is straddled by the staples and along which the staples slide to the delivery end of the guide where they are delivered one by one to the stapling mechanism. Heretofore the delivery mechanism has comprised a pivoted dog having a nose movable to and from the path of the staples sliding along the upper edge of the guide bar, the pivoted dog being lifted once during each stapling operation to permit a staple to slide past. This arrangement has not been satisfactory for various reasons. One disadvantage of this construction consists in that the repeated impacts of the dog on the upper edge of the raceway tend to wear a recess in the upper edge of the guide bar, thereby interfering with the sliding movement of staples along the bar. However a more serious difficulty consists in that when either the guide bar or the pivoted dog is removed for repair or replacement it is necessary to readjust the mechanism for controlling the movement of the dog so that it will lift away from the guide bar far enough to permit a staple to slide past but not far enough to permit more than one staple to slide past. Inasmuch as this is a rather delicate adjustment it is often necessary to call in an expert to readjust the machine after either the dog or the guide has been replaced.

Objects of the present invention are to avoid the aforesaid difficulties and to provide staple-feeding mechanism which is simple and economical in construction, which does not require readjustment when the guide is removed for repair or replacement, which does not produce localized wear on the upper edge of the guide bar and which is more reliable and durable in use than the prior arrangement above referred to.

The present invention involves a staple guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, together with a stop for blocking the movement of staples along the guide and means supporting the stop for movement toward and from the ridge between blocking position and a retracted position in which the staples may slide past, characterized in that the supporting means is mounted on the guide so that it is removable with the guide. Thus removal of the guide does not disturb the normal relationship between the guide and stop. Consequently when a guide is replaced no adjustment is necessary when the new guide is applied to the machine.

While the aforesaid ridge may be formed in

various ways, preferably it merely comprises the upper edge of a flat bar, the upper edge being rounded in cross-section. To assist in retaining the staples in position relatively to each other as they progress down the guide, a cover may extend along the guide in spaced relation to the ridge, in which case the aforesaid movable stop is preferably mounted on the cover. While the stop may be movably mounted in any suitable manner it is preferably mounted pivotally. Moreover it is preferably arranged so that while it may move into sufficiently close juxtaposition to the guide ridge to block the staples, it does not actually touch the guide, even in the absence of staples, thereby avoiding wear on the guide. Preferably the device comprises a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which the staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop. In the preferred embodiment the second stop comprises a plunger sliding in a socket which extends through the guide from bottom to top and a spring in the socket for holding the stop in its lower position.

In a still more specific aspect of the invention the first stop overlaps the second stop so that when the second stop is moved to its upper position it pushes the first stop to its upper position, permitting the foremost staple to pass from the first stop to the second stop, in combination with a spring for returning the first stop to its lower position when the second stop returns to its lower position. By arranging the second stop to be actuated by a movable part of the stapling mechanism, both stops are actuated in synchronism once during each stapling operation, a staple moving from the first stop to the second stop as the two stops are lifted and the staple then passing to the stapling mechanism when the stops return to their lower positions.

For the purpose of illustration a typical embodiment of the invention is shown in the accompanying drawing in which

Fig. 1 is a perspective view of a stapling machine of well-known type showing the head in retracted position;

Fig. 2 is an enlarged vertical section of the stapling head with the parts in advanced position;

Fig. 3 is a top plan view of the staple guide and feeding mechanism;

Fig. 4 is a side view of this mechanism;

Fig. 5 is a similar view of a part of the mechanism;

Fig. 6 is a section on line 6-6 of Fig. 4; and

Fig. 7 is a view similar to Fig. 2 showing the parts in retracted position.

The particular embodiment of the invention chosen for the purpose of illustration comprises a machine of well-known type including a base 1, a frame 2, and anvil 3 mounted on the frame, a head 4 movable up and down in guides 6 and 7 on the frame, a staple driver 8 reciprocating up and down in the guideway 9 in the head, the usual mechanism including pivoted arm 5 for actuating the movable parts, staple-feeding mechanism constructed according to the present invention, and a hopper 11 for supplying staples to the staple-feeding mechanism. The arm 5 acts on head 4 through a spring 15, the head and driver 8 moving down together until the head is stopped by the anvil 3 and the driver 8 then continuing downwardly to drive the staple. On the reverse movement the head is lifted by springs 10 until a shoulder on the head engages guide 7. The spring 15 is stronger than the springs 10 so that it overcomes the resistance of the lifting springs in the downward movement.

The staple-feeding mechanism comprises a guide bar 12 having the configuration shown in Figs. 3 and 4, a cover 13 mounted over the guide 12 to retain staples on the guide, and the first and second stops 16 and 17. The cover 13 is mounted on the guide 12 by means of three brackets 21, 22 and 23 which are welded or otherwise secured to the cover and which are mounted on the side of the guide 12 by means of screws 26 and pilot pins 27.

The stop 16 comprises an arm pivotally mounted at 26 in a recess in the delivery end of the cover 13, this recess being open at the bottom and closed at the top and sides so that the arm can swing in a clockwise direction but is limited in its counterclockwise movement by the tail end of the arm striking the ceiling of the recess. Mounted in the free end of the arm is a pin 27 which projects somewhat below the arm to engage the foremost staple as shown in Fig. 7. The arm is yieldingly held in this position by means of a leaf spring 28 mounted on the upper end of the bracket 21. The second stop 17 comprises a plunger sliding vertically in a socket in the delivery end of the guide 12. The plunger is yieldingly held in its lower position by means of a spring 29, the upper end of the spring seating against the upper end of the socket and the lower end of the spring seating against a collar fast to the plunger. In the lower position of the plunger shown in Fig. 7 its lower end projects below the socket but its upper end does not project beyond the ridge formed by the upper edge of the guide 12.

The vertically reciprocating head 4 is provided with a shoulder 30 which engages the lower end of the plunger 17 as the head 4 rises after a stapling operation. As shown in Figs. 2 and 7 the stop 16 overhangs the plunger 17 so that the plunger lifts the arm 16 to the position shown in Fig. 2, thereby permitting the staples to slide down against the upper end of the plunger 17. As the head 4 descends at the beginning of the next stapling operation the two stops are permitted to return to their lower positions in response to the springs 28 and 29. As the two stops

descend together the pin 27 on the arm 16 first seats on the second staple of the row, the foremost staple still being retained by the upper end of the plunger 17. This engagement of the pin 27 with the second staple arrests the downward movement of the arm 16 but the plunger 17 continues to descend until it is completely retracted into its socket, whereupon the foremost staple is free to slide into the guideway 9 in the path of the driver 8. After the driver has inserted the staple the head 4 rises to the position shown in Figs. 1 and 2, thus completing the cycle of operation.

From the foregoing it will be evident that both stops 16 and 17 are removable with the guide 12 and cover 13 as a unit. Thus the positions of the stops relatively to the guide may be accurately established at the factory where the machine is manufactured, and when the user has occasion to replace the guide he does not need to call in an expert to adjust the relative positions of the stops after the replacement has been effected. Inasmuch as there are no adjustable parts on the mechanism the relative positions of the parts cannot be tampered with. Owing to the simplicity of construction the guide unit can be manufactured at low cost, and at small expense the user can keep one or more extra guides in stock. Thus in case of accidental breakage the entire unit may be quickly replaced merely by removing the two screws which extend through the openings 32 and 33 to hold the unit on the machine.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, and a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, both of the stops being mounted on the guide so that they are removable with the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stop.

2. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, and a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance

approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, the second stop comprising a plunger sliding in a socket which extends through the guide from bottom to top and a spring in the socket for holding the stop in its lower position, both of the stops being mounted on the guide so that they are removable with the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stops.

3. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, a cover extending along the guide in spaced relation to the ridge, and means for mounting the cover on the guide, said first stop being mounted on the cover and said second stop being mounted directly on the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stops.

4. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, the first stop overlapping the second stop so that when the second stop is moved to its upper position it pushes the first stop to its upper position, permitting the foremost staple to pass from the first stop to the second stop, and a spring for returning the first stop to its lower position when the second stop returns to its lower position, and both of the stops being mounted on the guide so that they are removable with the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stops.

5. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, and a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, the second stop comprising a plunger sliding in a socket which extends through the guide from bottom to top and a spring in the socket for holding the stop in its lower position, the first stop overlapping the second stop so that when the second stop is moved to its upper position it pushes the first stop to its upper position, permitting the foremost staple to pass from the first stop to the second stop, and a spring for returning the first stop to its lower position when the second stop returns to its lower position, and both of the stops being mounted on the guide so that they are removable with the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stops.

6. In a stapling machine, a staple guide for supporting staples and guiding them along a predetermined path, the guide having a ridge which is adapted to be straddled by staples and along which the staples may slide to the delivery end of the guide, a stop mounted for movement between a lower position in which it is juxtaposed to the ridge to block the staples and an upper position in which staples may slide past, a second stop mounted for movement between an upper position in which it projects above the ridge to block the staples and a lower position in which staples may slide past, the second stop being located beyond the first stop a distance approximately equal to the width of a staple so that when the first stop moves to its upper position the staples on the guide advance against the second stop, the first stop overlapping the second stop so that when the second stop is moved to its upper position it pushes the first stop to its upper position, permitting the foremost staple to pass from the first stop to the second stop, and a spring for returning the first stop to its lower position when the second stop returns to its lower position, a cover extending along the guide in spaced relation to the ridge, and means for mounting the cover on the guide, said first stop being mounted on the cover and said second stop being mounted directly on the guide, whereby removal of the guide does not disturb the normal relationship between the guide and stops.

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