J. MUTH.

STAPLE DRIVING MACHINE.

APPLICATION FILED MAR. 24, 1921.

1,397,176. Patented Nov. 15, 1921.

Fig. 1

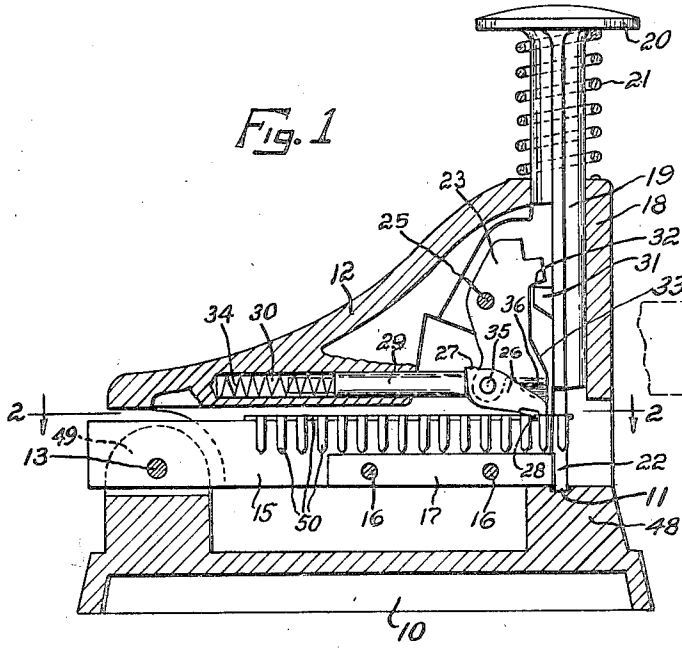


Fig. 4

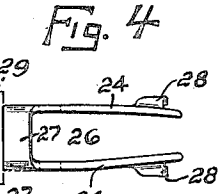


Fig. 5

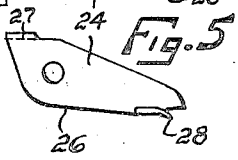


Fig. 2

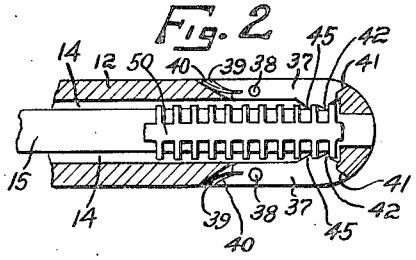


Fig. 3

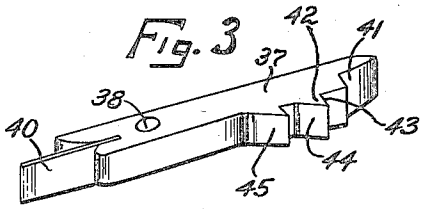


Fig. 6

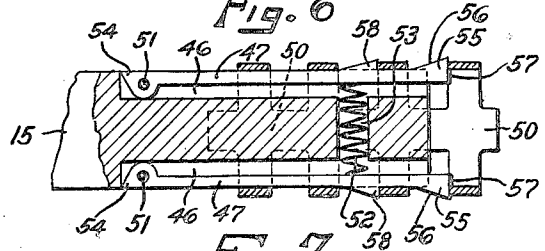


Fig. 8

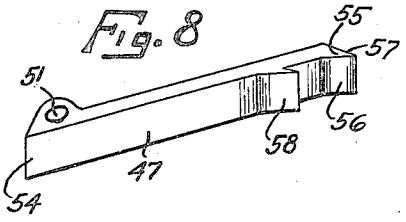
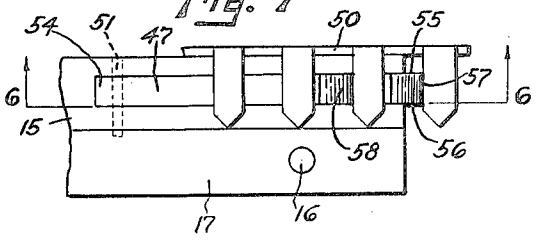


Fig. 7



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STAPLE-DRIVING MACHINE.

1,397,176. Specification of Letters Patent. Patented Nov. 15, 1921.

Application filed March 24, 1921. Serial No. 455,123.

To all whom it may concern:

Be it known that I, JOHN MUTH, a citizen of the United States, residing at Norwalk, county of Fairfield, State of Connecticut, have invented an Improvement in Staple-Driving Machines, of which the following is a specification.

This invention relates to stapling machines, and more particularly to that type known as strip staple machines, wherein each staple, at the time it is driven, is severed from a strip of integrally connected staples which is fed forward at each operation of the machine to bring the staples successively into a position to be severed and driven.

The invention has for its general object the provision of a novel stapling machine of this general type which is of simple and inexpensive construction, which is durable and not likely to get out of repair, and which is positive and reliable in its operation.

Another object of the invention is to provide, in a machine of this general type, simple and positive means for rigidly holding, during the severing operation, the prongs of each staple as it is severed from the strip, thereby overcoming the tendency frequently encountered in the use of machines of this type on the part of the cutting and driving mechanism, particularly when said mechanism has become slightly dull, to bend the staples and wedge the same in the throat of the machine instead of severing them cleanly and driving them straight through the throat in the proper manner.

With the foregoing and other objects in view, I have devised the novel stapling machine which I will now describe, reference being had to the accompanying drawing forming a part of this specification and in which:

Figure 1 is a longitudinal vertical section of the complete machine, showing the interior parts in elevation.

Fig. 2 is a horizontal section of the forward part of the machine taken substantially on the line 2—2, Fig. 1.

Fig. 3 is a perspective view, on an enlarged scale, of one of the staple holding members.

Fig. 4 is an enlarged plan view, and Fig. 5, an enlarged side elevation of the feed pawl.

Fig. 6 is an enlarged horizontal section, taken substantially on the line 6—6, Fig. 7, of the staple carrying bar, showing a modified construction.

Fig. 7 is a side elevation of the parts shown in Fig. 6.

Fig. 8 is a view similar to Fig. 3 of one of the staple holding members shown in Figs. 6 and 7.

10 denotes the machine base, which is provided at its forward end with an anvil 48 having the usual concave clenching recess 11. Pivoted to said base is the head of the machine, which comprises a casing 12 having at its lower side a longitudinal recess 14 in which is located a staple strip carrying bar 15 upon which the staple strip slides, said bar being secured to the casing by pins 16, and being pivoted at 13 between upstanding ears 49 at the rear end of the base 10. The bar 15 is centrally located in the recess 14, and the upper portion thereof is spaced from the lateral walls of said recess by plates 17 interposed between said bar and walls in order to provide the necessary clearance for the free passage of the staple strip 50. At its forward end, the casing 12 is formed with a vertically disposed, substantially cylindrical guide 18 for vertically reciprocating plunger 19 having a knob or hand piece 20 at its upper end. A coil spring 21 is interposed between the hand piece 20 and the top of the guide 18, said spring normally holding the plunger in raised position. The flat forward end of the bar 15 is disposed in substantial alinement, or in substantially the same vertical plane with the flat rear face of the plunger 19, only sufficient clearance being provided between said bar and plunger to permit the latter to pass the former and coöperate therewith to shear off the first staple of the strip when the plunger is depressed. The staple strip 50 is supported and slides on the top of the bar 15 with its foremost staple normally projecting beyond the end of the bar in a position to be severed from the strip by the

plunger 19 in its downward movement and driven through the throat 22 of the machine upon the anvil 48.

23 denotes a cam plate pivoted at 25 within the casing 12 at the rear of the plunger 19. 26 denotes a feed pawl comprising a pair of arms 24 lying at opposite sides of the cam plate 23 and pivoted thereto at 35. The upper edges of the rear ends of the arms 26 are connected by a bridge piece 27, while their forward ends press at their lower sides upon the top of the staple strip and are provided with downwardly inclined beveled teeth 28. The arms 24 straddle the continuous portion of the staple strip 50 and engage the upper portions of the individual staples thereof, the beveled ends of the lugs 28 causing them to be wedged beneath said staples as the feed pawl is moved forwardly, thereby positively holding said pawl in engagement with the strip, preventing it from riding idly thereover during its forward movement and insuring the proper feeding of the staples. 29 denotes a plunger guided for longitudinal movement in a horizontal recess 30 in the casing 12, said plunger being yieldingly forced outwardly by a spring 34 in said recess, and engaging at its forward end the bridge piece 27 of the pawl 26, thereby normally holding said pawl in its forward position with its forward end depressed against the staple strip. The cam plate 23 is oscillated on its pivot 25 at each reciprocation of the plunger 19 by a lug 31 on said plunger which engages upper and lower cam surfaces 32 and 33 formed on said cam plate, said cam surfaces being so designed that at each oscillation of the cam plate the feed pawl will be moved a distance corresponding with the width of one staple on the strip. When the plunger 19 is depressed, engagement of the lug 31 with the cam surface 33 causes the feed pawl 26 to be retracted or moved backwardly upon the staple strip, and when said plunger is raised engagement of said lug with the cam surface 32 causes said feed pawl to be moved forwardly to advance the strip. As indicated at 36, the cam plate 23 is slightly beveled at its lower end, and the forward ends of the arms 24 on the feed pawl 26 are bent slightly inwardly to engage the beveled portions of the plate, thereby holding said pawl against lateral movement and also preventing it from being raised too high, while permitting it to ride over the staple strip on its backward movement.

In machines of this type, as heretofore constructed, considerable trouble has been caused by bending of the staples and wedging thereof in the throat 22. After the machine has been in use for some time, the coöperating shearing edges on the front end of the bar 15 and on the lower end of the plunger 19 becomes dull, so that the plunger tends to bend the end staple around the edge of the bar instead of cutting it squarely from the strip. In order to overcome this difficulty and in accordance with the present invention, the following means are employed.

Referring to Figs. 2 and 3, 37 denotes dogs pivoted at 38 in slots 39 in the sides of the casing 12 adjacent the forward end of the bar 15, said dogs being provided at their rear ends with leaf springs 40 which engage the ends of said slots and tend to force the forward ends of said dogs inwardly, said leaf springs being preferably set in kerfs cut in the rear ends of said dogs. The dogs 37 are provided at their forward ends with stop shoulders 41 which engage complementary shoulders at the forward ends of the slots 39, thereby limiting the inward movement of said dogs, the outer edges of which are, at this time substantially flush with the outer surface of the casing 12. Slightly in the rear of the stop shoulders 41 the dogs 37 are formed with lateral projections 42 having beveled rear faces 44 and front faces 43 which are squared off parallel with the front face of the bar 15 and lie slightly in front thereof.

In operation, as the staple strip is fed forwardly by the feed pawl 26, the legs or prongs of the foremost staple thereof engage the beveled faces 44 of the projections 42, thereby forcing the dogs 37 outwardly and permitting said staple to pass said projections, after which the springs 40 will return the dogs 37 to normal position, causing the square faces 43 of the projections 42 to engage the rear sides of the legs of the staple, thereby positively and rigidly holding the latter in upright position, and preventing the same from being bent around the end of the bar 15 when the plunger 19 descends. It will be seen that, in addition to this function, the projections 42 will also act as detents to hold the staple strip against rearward or retrograde movement during the rearward movement of the feed pawl 26. In order to insure the latter operation, particularly after the foremost staple has been severed from the strip, each of the dogs 37 is preferably provided with a second projection 45 similar to the projection 42 and adapted in a similar manner to engage the next succeeding staple of the strip.

The continuous portion of the staple strip 50 which integrally connects the several staples and which must be cut in order to sever the individual staples from the strips, is relatively narrow, so that the lower, or cutting and driving end of the plunger 19 may be made of such a width that it will readily pass between the projections 42 on the dogs 37 without engaging or injuring the same and without interfering with their operation.

In the form of the invention shown in Figs. 6, 7 and 8, the staple carrying bar 15

is provided at its forward end, and slightly below its upper surface, with parallel lateral slots or grooves 46 in which are located dogs 47 pivoted at 51. Said dogs 47 are normally forced outwardly by a spring 52 interposed between them and located in a transverse chamber 53 in said bar, the outward movement of said dogs being limited by engagement of shoulders 54 thereon with the inner ends of said grooves, said dogs at this time lying with their outer edges substantially flush with the lateral faces of the bar. At their forward ends the dogs 47 are formed with outwardly projecting teeth 55 having beveled rear faces 56 and square front faces 57 lying slightly in front of the forward end of the bar 15 and adapted to engage the rear sides of the legs of the foremost staple. In the rear of the tooth 55, and spaced therefrom to correspond with the spacing of the staples on the strip, each dog 47 is provided with a second tooth 58 substantially similar to tooth 55. The operation of the teeth 55 and 58 is substantially the same as that of the teeth 42 and 45 in the form of the invention first described, as will, it is thought, be fully understood without further explanation.

Having thus described my invention, I claim:

1. In a strip staple machine provided with a casing, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger, a feed pawl pivoted to said plate, and a spring pressed plunger mounted to slide in the casing and engaging said pawl and tending to hold the pawl in engagement with the strip.

2. In a strip staple machine, the combination with means for supporting a staple strip and means for severing and driving the individual staples, of means for feeding said strip comprising a feed pawl having a portion adapted to engage the top of said strip and a beveled lug adapted to engage under the individual staples thereof for holding said pawl in engagement with said strip during a feeding movement of the pawl.

3. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger, a feed pawl pivoted to said plate and having a portion adapted to engage the top of said strip and a beveled lug adapted to engage under the staples thereof for holding said pawl in engagement with said strip during a feeding movement of the pawl, and a spring pressed plunger engaging said pawl.

4. In a strip staple machine, the combination with means for supporting a staple strip and means for severing and driving the individual staples, of means for feeding said strip comprising a pivoted feed pawl having a pair of arms provided with means at the under sides of their forward ends to engage the staple strip and hold it in engagement therewith during the feeding movement and connected at the upper sides of their rear ends by a bridge piece, and means engaging said bridge piece for holding said arms in engagement with said strip.

5. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger, a feed pawl pivoted to said plate, said pawl having a pair of arms provided with means at the under sides of their forward ends to engage the staple strip and hold it in engagement therewith during the feeding movement and connected at the upper sides of their rear ends by a bridge piece, and a spring pressed plunger engaging said bridge piece.

6. In a strip staple machine, the combination with means for supporting a staple strip and means for severing and driving the individual staples, of means for feeding said strip comprising a feed pawl having a pair of arms connected at the upper sides of their rear ends by a bridge piece, said arms at their forward ends engaging the top of said strip and having beveled lugs adapted to engage under the individual staples thereof for holding said arms in engagement with said strip during the feeding movement of the pawl.

7. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger, a feed pawl pivoted to said plate and having a pair of arms connected at the upper side of their rear ends by a bridge piece, said arms at their forward ends engaging the top of said strip and having beveled lugs adapted to engage under the individual staples thereof for holding said arms in engagement with said strip during the feeding movement of the pawl, and a spring pressed plunger engaging said bridge piece.

8. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip, comprising an oscillating plate operated by said plunger and having a portion beveled on opposite sides thereof, a feed pawl pivoted to said plate and having a pair of strip engaging arms lying respec-

tively on opposite sides of and engaging the beveled portion of said plate whereby it is guided laterally.

9. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger and having a lower end beveled on opposite sides thereof, a feed pawl pivoted to said plate and having a pair of arms lying respectively on opposite sides of and engaging the beveled end of said plate whereby said pawl is guided laterally, said arms having means at the under side of their forward end to engage the staple strip and being connected at the upper sides of their rear ends by a bridge piece, and means engaging said bridge piece for holding said arms in engagement with said strip.

10. In a strip staple machine, the combination with means for supporting a staple strip and a plunger for severing and driving the individual staples, of means for feeding said strip comprising an oscillating plate operated by said plunger and having a beveled lower end, a feed pawl pivoted to said plate and having a pair of arms lying respectively on opposite sides of and engaging the beveled end of said plate and connected at the upper sides of their rear ends by a bridge piece, said arms at their forward ends engaging the top of said strip and having beveled lugs adapted to engage under the individual staples thereof for holding said pawl in engagement with said strip during a feeding movement of the pawl, and a spring pressed plunger engaging said bridge piece.

11. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pivotally mounted, laterally movable, rigid dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation.

12. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, said machine having a portion provided with a slot, of a dog pivoted in said slot and having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dog outwardly in the slot about its pivot to staple holding position.

13. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, said machine having a portion provided with a slot, of a dog pivoted in said slot and laterally movable therein, said dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dog about its pivot to staple holding position.

14. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pair of independently pivoted, laterally movable, rigid dogs having portions adapted to engage the legs of the foremost staple on said strip and hold said staple against turning during the severing operation.

15. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pair of independently pivoted, rigid dogs having portions adapted to engage the legs of the foremost staple on said strip and hold said staple against turning during the severing operation.

16. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, said machine having a portion provided with a pair of oppositely disposed slots, of dogs pivoted in said slots respectively and having portions adapted to engage the legs of the foremost staples on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dogs on their pivots to staple holding position.

17. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a rigid dog mounted on a fixed pivot and laterally movable thereon, said dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation.

18. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pivotally mounted rigid dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dog on its pivot to staple holding position.

19. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pair of pivotally mounted rigid dogs having portions adapted to engage the legs of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dogs to staple holding position.

20. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a rigid dog mounted on a fixed pivot and having a portion adapted to engage a leg of the foremost staple on said staple strip and hold said staple against turning during the severing operation.

21. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a dog having a plurality of rigid teeth adapted to engage the legs of successive staples at the forward end of said strip and hold the staples against turning during the severing operation.

22. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a pivoted dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, yielding means tending to turn the dog on its pivot to staple holding position and means for limiting the movement of said dog on its pivot.

23. In a staple strip machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, of a rigid, pivoted dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and means for limiting the movement of said dog on its pivot.

24. In a strip staple machine, the combination with means for feeding a staple strip and means for severing and driving the individual staples, said machine having a portion provided with a slot, of a dog pivoted in said slot and having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, said dog having a shoulder adapted to engage the end of said slot and limit the movement of said dog on its pivot.

25. In a strip staple machine, the combination with a casing having a slot, means for feeding a staple strip, and means for severing and driving the individual staples, of a dog pivoted in said slot and having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dog on its pivot to staple holding position.

26. In a strip staple machine, the combination with a casing having a slot in its side wall, means for feeding a staple strip, and means for severing and driving the individual staples, of a dog pivoted in said slot and laterally movable therein, said dog having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dog on its pivot to staple holding position.

27. In a strip staple machine, the combination with a casing, having oppositely disposed slots in its walls, means for feeding a staple strip, and means for severing and driving the individual staples, of dogs pivoted in said slots respectively and having portions adapted to engage the legs of the foremost staple on said strip and hold said staple against turning during the severing operation, and yielding means tending to move the dogs on their pivots to staple holding position.

28. In a strip staple machine, the combination with a casing, having a slot, means for feeding a staple strip, and means for severing and driving the individual staples, of a dog pivoted in said slot and having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, said dog having a shoulder adapted to engage the end of said slot and limit the movement of said dog on its pivot.

29. In a strip staple machine, the combination with a casing, having a slot, means for feeding a staple strip, and means for severing and driving the individual staples, of a dog pivoted in said slot and having a portion adapted to engage a leg of the foremost staple on said strip and hold said staple against turning during the severing operation, and a spring carried by the end of said dog and engaging the end of said slot.

In testimony whereof I affix my signature.

JOHN MUTH.