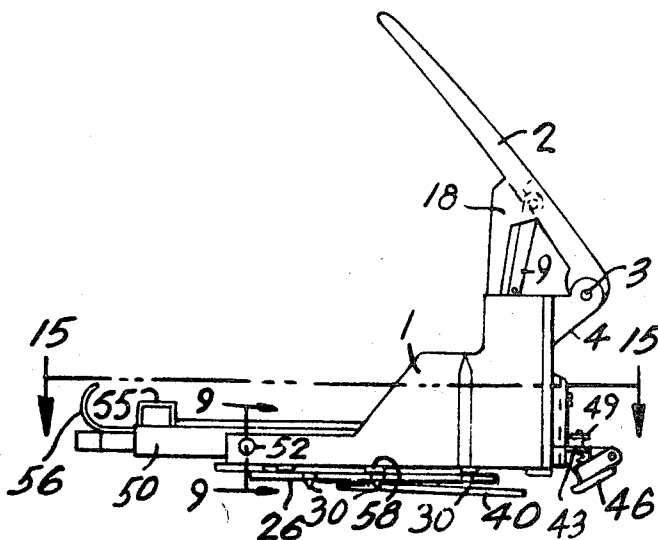
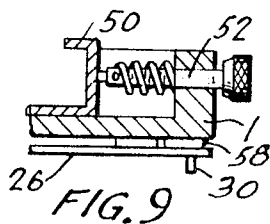
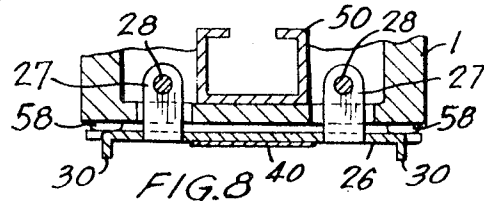
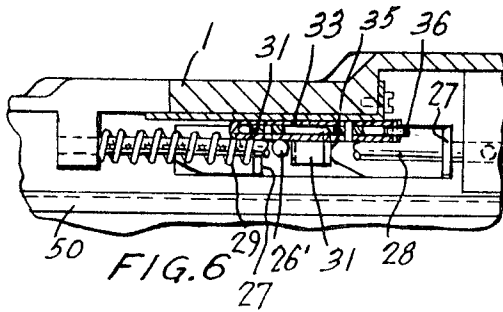
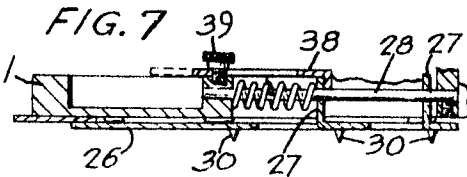
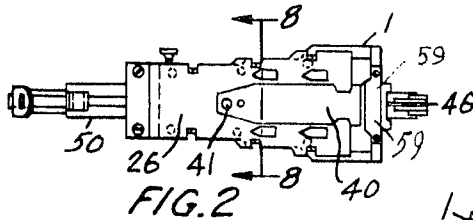
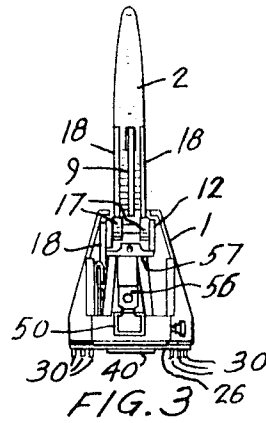
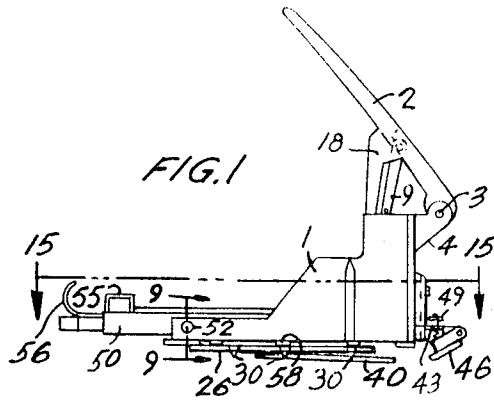


[11] 3,595,461

ABSTRACT: A stapling machine with automatic advance designed especially for making carpet joints.



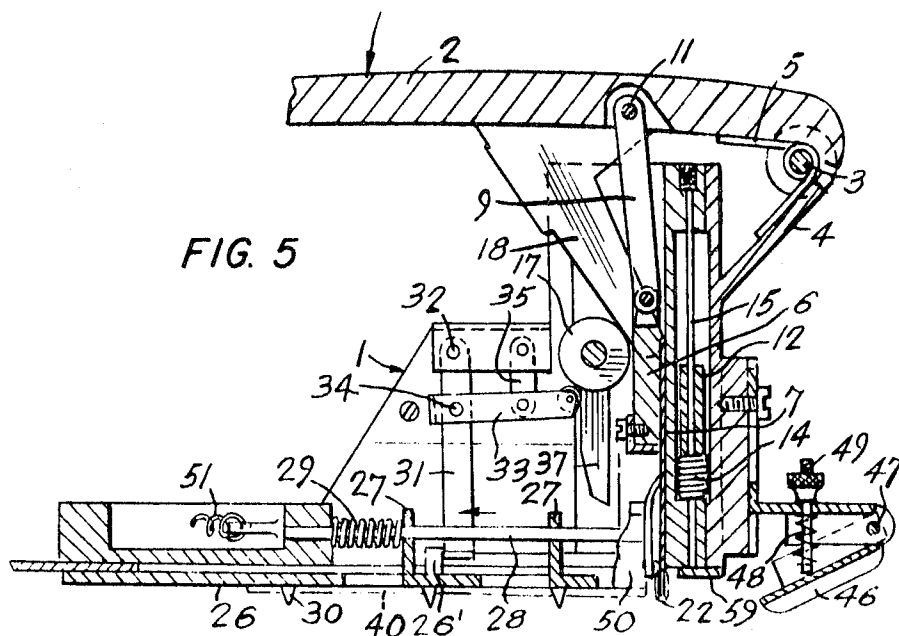
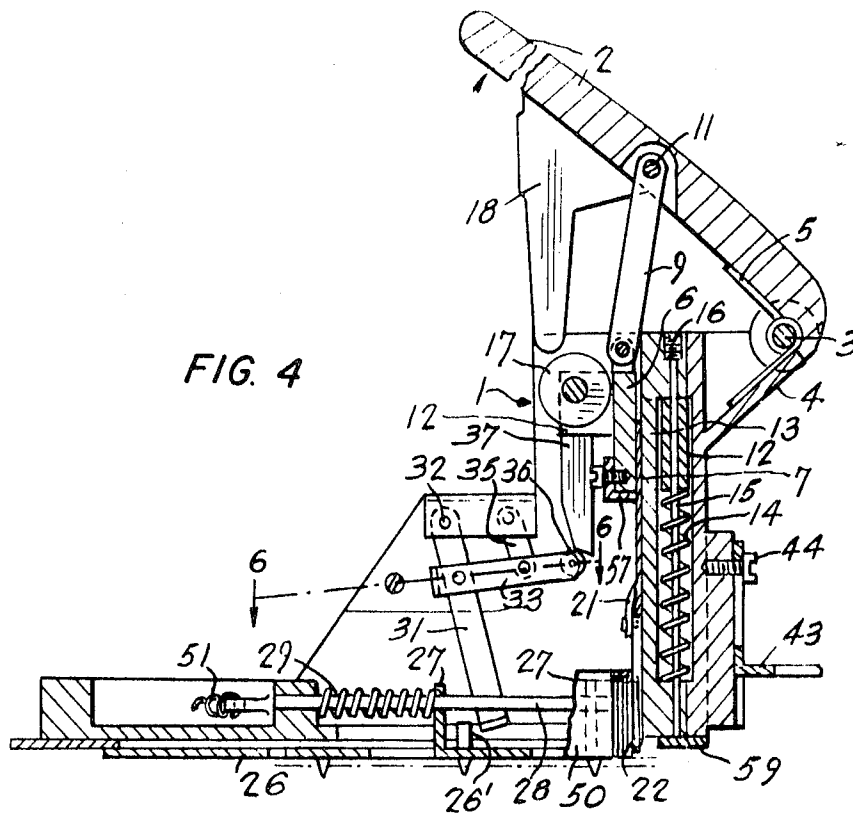


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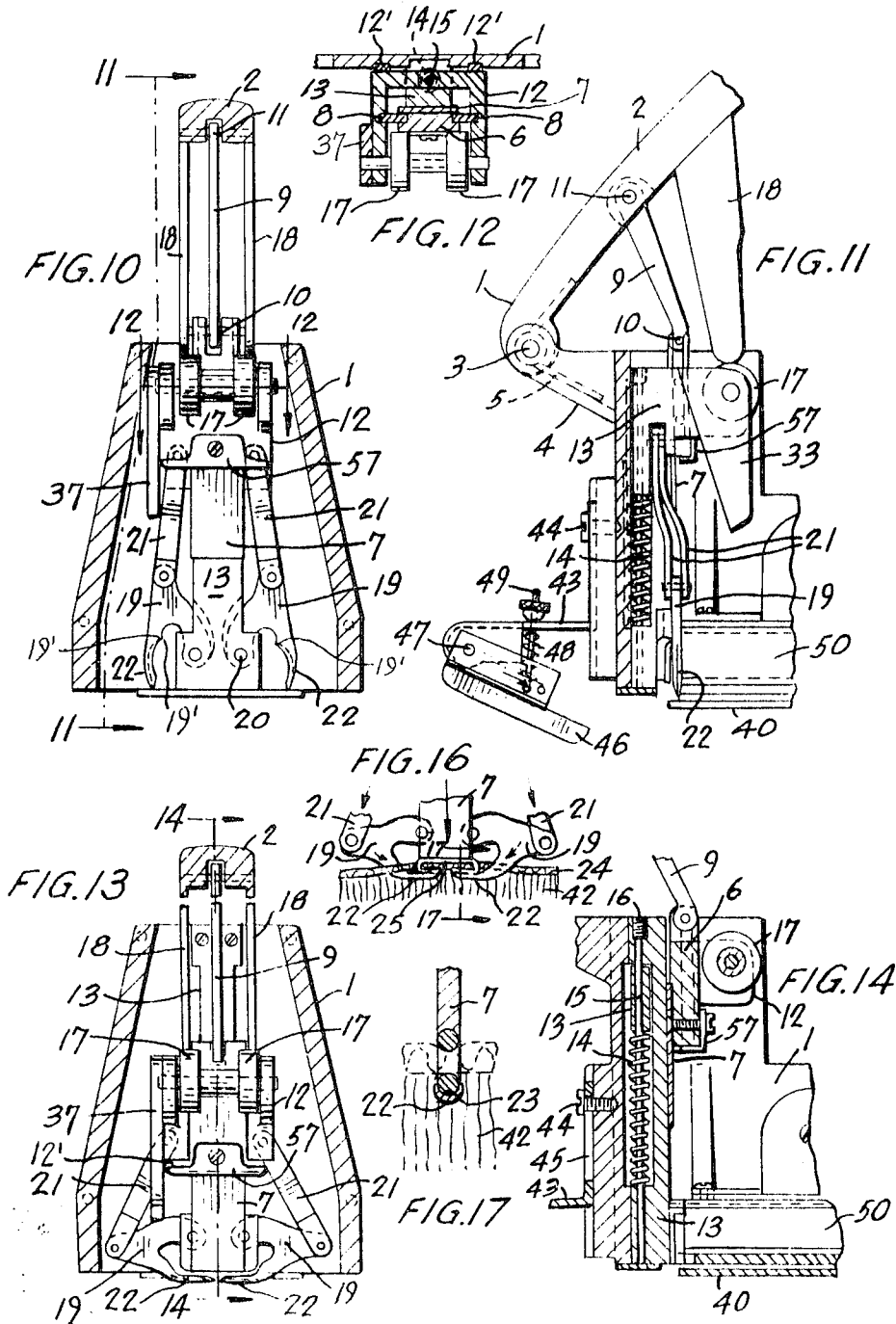
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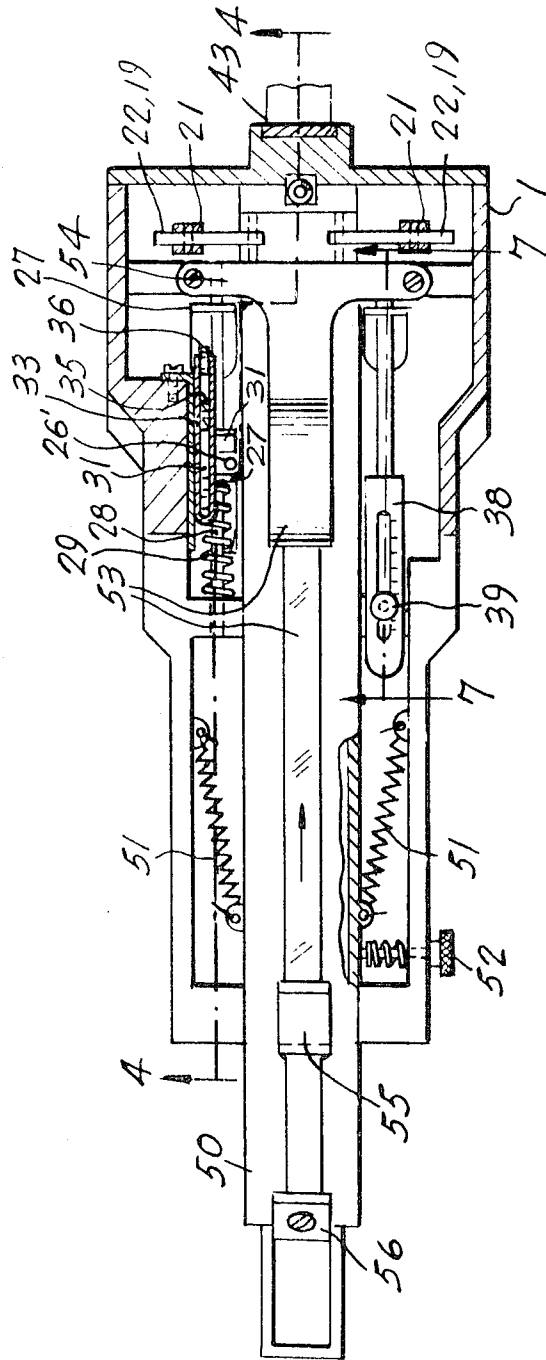


FIG. 15

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STAPLING MACHINE WITH AUTOMATIC ADVANCE

The present invention relates to a stapling machine more particularly designed for making carpet joints, that is to form a butt joint between two pieces of carpet, which is invisible on the pile side.

The main object of the present invention resides in a stapling machine provided with means for automatically advancing the machine along the carpet joint or other material which it is desired to staple, so as to automatically staple the material at regular intervals at each operation of the handle of the machine.

Another object of the invention resides in the provision of a machine of the character described, which includes spring blade means to press the inverted carpet down against a floor or other support surface in the area where the staple clinching anvils enter the carpet fabric so as to maintain the flexible carpet in flat and pressed condition, during the insertion of the anvil tips, even if the support surface is slightly uneven, and to press the carpet against the anvils while said anvils continue their converging closing course and move upwardly towards the bottom of the front end of the magazine where the staples are ejected, thus the spring blade means cause the anvil tips to follow close to the fabric of the carpet, in between the said fabric and the carpet pile; once closed, the anvils exert an upward force on the two carpet pieces at the joint and these pieces take on angled position before the staple is inserted; staple insertion is done by continuing to press down on the machine main lever and the fabric is thus clinched at the joint; when retracting the anvils, the carpet pieces flatten on the floor, by the downward pressure of the spring blade means and of the machine, and any looseness in the joint that might have occurred by the penetration of staples is eliminated whereby a close joint is obtained. The spring blade means press the carpet pieces against the converging anvils and prevent rupture of the carpet fabric irrespective of the hardness or softness of the fabric, and of certain variations of its thickness.

Another object of the invention resides in the provision of a stapling machine of the character described, provided with a guide member for guiding the machine exactly along the butt joint to be stapled during the advance of the same, thus permitting the legs of the staple to be inserted at equal distance on each said of the joint to be made. The guide member also serves as a rest on or fulcrum point when rocking of the machine, to allow easier release of the advance plate.

Another object of the invention resides in the provision of shoulders on the anvils, to firmly close the joint to be made, before and during the stapling operation, also to reinforce the anvil area first hit by the staples, and to make it possible to reduce the thickness of the anvils to a minimum size, which is required to avoid the breakage of the fabric, and loosen the piles of the carpet.

Another object of the invention resides in the provision of means for adjusting the amount of advance of the machine at each stapling operation.

The foregoing and other objects of the invention will become more apparent during the following disclosure and by referring to the drawings, in which:

FIG. 1 is a side elevation of the machine;

FIG. 2 is a bottom plan view;

FIG. 3 is a rear end view;

FIG. 4 is a partial longitudinal section with the handle in raised position taken on line 4-4 of FIG. 15;

FIG. 5 is a similar longitudinal section with the handle in lowered position and the machine advanced;

FIG. 6 is a partial plan section, on an enlarged scale, taken along line 6-6 of FIG. 4;

FIG. 7 is a partial longitudinal section, on an enlarged scale, taken along line 7-7 of FIG. 15;

FIG. 8 is a partial cross section, on an enlarged scale, taken along line 8-8 of FIG. 2;

FIG. 9 is a partial cross section, on an enlarged scale, taken along line 9-9 of FIG. 1;

FIG. 10 is a cross section looking towards the front end of the machine with the operating handle in raised inoperative position;

FIG. 11 is a partial longitudinal section taken along line 11-11 of FIG. 10;

FIG. 12 is a cross section taken along line 12-12 of FIG. 10;

FIG. 13 is a cross section, similar to that of FIG. 10, but showing the mechanism in operative position;

FIG. 14 is a partial longitudinal section taken along line 14-14 of FIG. 13;

FIG. 15 is a top plan section taken along line 15-15 of FIG. 1;

FIG. 16 is a partial front elevation showing the handle in staple-clinching position extending through the fabric of two pieces of carpet to be joined by a staple; and

FIG. 17 is a cross section, on an enlarged scale, taken along line 17-17 of FIG. 16.

In the drawings, like reference characters indicate like elements throughout.

The staple machine comprises a casing 1, open at the top and bottom and of generally elongated shape.

An operating handle 2 is pivoted at 3 to an arm 4 protruding from the front of casing 1. Handle 2 is normally maintained in upper inoperative position by coil spring 5 surrounding the pivot 3 and bearing against the handle and arm 4.

The staple ejecting mechanism includes a stapling plunger 6 (see FIG. 14), to which is secured a stapling blade 7. Plunger 6 and stapling blade 7 define therebetween lateral grooves slidably receiving guideways 8 and are therefore vertically guided by the latter. They are actuated for up-and-down movement in guideways 8 (see FIG. 12 and 14) by means of a link 9 pivoted to the plunger 6 and to the handle 2 at 10 and 11 respectively.

An anvil operating mechanism includes a carriage 12 which carries the guideways 8 (see FIG. 12) and which surrounds, and is guided, by a guide member 13 secured to casing 1 and is normally retained in upper position by means of a coil spring 14 located between guide member 13 and the front of the casing and guided by, and surrounding, a rod 15 held in position by setscrew 16. At the casing front wall, carriage 12 slides on strips 12' (see FIG. 12) of synthetic resin to reduce friction.

Carriage 12 carries a pair of idle rollers 17 engageable by the ends cam arms 18 secured to handle 2, whereby carriage 12 is moved downwardly to a limit position upon downward pivotal movement of handle 2. Further downward movement of the handle 2 causes the side edges of cam arms 18 to ride on the rollers 17 thereby keeping carriage 12 locked down, while the stapling plunger 6 moves down to eject a staple.

A pair of anvils 19 are pivoted at 20 to the guide member 13 and these anvils are actuated between inactive position shown in FIG. 10 and active position shown in FIG. 13 by downward movement of carriage 12, the anvils 19 being pivotally connected to said carriage by links 21.

The anvils 19 form shoulders 19' extended by pointed fingers 22 provided with a groove 23 on the inside thereof; the fingers are adapted to pierce the material, such as carpet fabric 24, shown in FIG. 16, and move close together to clinch the legs of a staple 25, subsequently ejected through the fabric 24 by the stapling blade 7.

Coil spring 14 returns carriage 12 and, consequently, returns the anvils 19 in inoperative position upon release of handle 2.

A stop member 57 carried by plunger 6 abuts carriage 12 in the elevated position of both the carriage and plunger and serves to prevent upward removal of plunger 6 and blade 7, upon return of handle 2 to inoperative position while anvils would remain stuck in operative position. As shown in FIG. 13, stop member 57 has lateral extensions disposed vertically underneath horizontal downwardly facing steps 12' of carriage 12. If the anvils remain stuck with the carriage 12 in downward position, upward movement of handle 2 positively moves plunger 6 upwardly and the latter pulls up carriage 12 by means of stop member 57.

In accordance with the main feature of the present invention, the stapling machine is provided with means for automatically advancing the machine at each stapling operation. These means include a material-engaging plate 26 movably mounted underneath the casing 1; said plate 26, shown in FIGS. 2, 4, 5, 7 and 8, is located under the casing, is substantially coextensive therewith and is guided for longitudinal movement with respect to the same. It is slidable on frictionless pads 58 (see FIG. 9) carried by the underside of casing 1.

Plate 26 has upstanding ears 27 slidably mounted on rods 28 longitudinally disposed and secured to the casing near the base thereof.

Compression coil springs 29 surround rods 28 and abut against one ear 27 and the casing 1, so as to urge the plate 26 forwardly of the casing.

Plate 26 has downwardly extending triangular flat prongs 30, struck out from plate 26 and adapted to engage the work, such as carpet fabric. Prongs 30 prevent lateral as well as longitudinal movement of plate 26 relative to the work.

A lever 31 is pivoted at its upper end 32 to a plate 1' secured to casing 1, while its lower end is adapted to engage a stud 26' protruding from plate 26.

A second lever 33, generally horizontally disposed and of U-shaped formation, is pivoted at 34 to lever 31 below its pivot 32 and extends forwardly of the casing. Lever 33 is retained in substantially horizontal position by a link 35 pivoted thereto and to plate 1'.

The forward end of the second lever 33 carries a cam follower roller 36 engageable with a cam arm 37 rigidly carried by carriage 12 and extending downwardly therefrom.

Referring to FIGS. 4 and 5, it will be seen that downward movement of the operating handle 2 will cause cam arm 37 to immediately move lever 31 rearwardly with respect to the casing and, consequently, plate 26 being stationary with respect to the work, the entire stapling machine will be quickly moved forwardly just prior to the anvils 19 starting to enter the fabric of the carpet or other work. During this movement, springs 29 are compressed.

After the stapling operation has been completed, handle 2 is allowed to move upwardly and the operator rocks casing 1 downwardly towards the front using the front end of the guide 46 as a rest point, so as to release plate 26 from engagement with the carpet fabric, whereby said plate moves forwardly of the casing ready for the next stapling operation.

Means are provided to regulate the amount of advancing movement of casing 1 for each stapling operation. These means include an L-shaped stop member 38 having a longitudinal slot (see FIG. 7 and also FIG. 15) through which a setscrew 39 extends and is screwed in the base of the casing 1.

The downwardly turned flange of the stop 38 is adapted to abut against a rear ear 27 of plate 26 to limit forward movement of the plate with respect to the casing under the action of coil springs 29.

As shown in FIG. 15, stop 38 may be marked to indicate the distance to which the machine will advance at each stapling operation.

When the machine is used in conjunction with carpet stapling, a spring blade 40 is secured to plate 26 by means of rivets 41, or the like, at the back end of the plate and said blade is downwardly forwardly inclined when not stressed, as shown in FIG. 1, so as to press down on the carpet fabric in the area of the staple and anvils.

A guide member is arranged in front of the casing 1 to guide the stapling machine exactly along the carpet joint. The guiding means includes a bracket 43 vertically adjustably secured by setscrew 44 engaging a slot 45 of the vertical leg of the bracket so as to disengage the guide from the carpet when the guide is not required.

The horizontal leg of the bracket carries a guide member 46 in the form of a blade pivoted at 47 to the bracket 43 and urged downwardly by spring 48 surrounding an adjustable nut and screw 49 to limit the downward movement of the blade 46. This blade is disposed longitudinally exactly in alignment with the center line of the casing and with the row of staples.

The staples are carried in the usual manner in a staple magazine 50, which is slidably longitudinally mounted within the casing front and is urged forwardly against the casing part 13 on which the stapling blade 7 moves by means of tension springs 51, laterally connected thereto, and to the casing 1 (see FIG. 15). The front end of staple magazine 50 has recessed front and bottom walls for the passage of stapling blade 7 and of the staple being ejected.

The staple magazine 50 may be retained in retracted position against the action of springs 51 by means of a spring-urged stop 52 laterally mounted in the base of casing and engageable with a hole in the magazine 50 (see FIGS. 9 and 15). This allows maintaining the magazine 50 in retracted position to facilitate access to a staple which may have become stuck in the machine during a stapling operation.

Referring to FIGS. 1 and 15, the row of staples in the magazine are urged in conventional manner forwardly by a spring blade 53 rolled on a bracket 54 secured to the casing 1, the spring blade being terminated by the conventional staple pusher 55 and handle 56.

As previously mentioned, the staple machine of the invention is more particularly designed for joining two pieces of carpet and form a butt joint, thereby eliminating the conventional method of using a needle and thread.

The joint obtained with the machine of the invention is completely invisible on the pile side and very strong and no wrinkles are produced in the carpet in the area of the joint.

The carpet pieces are turned upside down, as shown in FIG. 16, laid flat on a floor or other support surface and arranged to form a butt joint. The machine is laid longitudinally of the carpet joint across the same. Operation of handle 2 causes the machine to press down on the carpet pieces and blade 40 is bent upwardly towards plate 26 to maintain the carpet pieces in the area of the stapling mechanism flat against the support surface, even if this surface is slightly uneven. The anvil tips describe circular arcs about pivots 20 during their movement. They first move downwardly and inwardly during their insertion through the carpet fabric; they then continue their converging closing course and they finally move upwardly towards the bottom of the magazine forward end, where the staples are to be ejected, until the anvils reach a stop position. Thus, the carpet pieces are first pressed down against the floor, then pressed together along the joint, then pressed upwardly against the action of spring blade 40. The latter presses the carpet fabric against the anvils and thus causes the anvil tips to follow close to the fabric of the carpet in between the fabric and the carpet pile, despite certain variations in the thickness of the carpet fabric. When the anvils are closed, the fabric pieces take a slightly angled position due to the converging forces exerted by the anvils. Staple insertion is effected after the anvils are closed by continuing to press on the main lever 2 and the fabric is thus clinched at the joint. When the carpet pieces subsequently take a flattened position, any looseness in the carpet joint which might have occurred during staple insertion is eliminated, because the carpet pieces were slightly angled during the penetration of the staple, thus enabling to obtain a tight joint.

Upon downward movement of handle 2, the entire casing 1 moves forwardly relative to the carpet. This is obtained as follows: cam arms 18 engage and move rollers 17 downwardly; carriage 12, carrying rollers 17 moves downwardly together with cam arm 37; the latter causes rearward pivoting of lever 31 and consequently of plate 26 relative to the casing 1. Because plate 26 is stationary relative to the carpet, casing 1 advances immediately before stapling. After stapling, handle 2 is allowed to pivot upwardly under action of spring 5, and casing 1 is rocked downwardly forwardly by means of handle 2 to lift plate 26 and release it from the carpet; released plate 26 moves forwardly relative to casing 1 under action of springs 29.

It will be realized that the shoulder 19' of the anvils 19 firmly close the joint to be made upon converging closing course of the anvils; the shoulders also reinforce the area first hit by the staples and make it possible to reduce the thickness

of the fingers 22 in order to avoid breakage of the fabric and loosening of the carpet piles.

Preferably, the machine is provided with a spacer plate 59 (see FIGS. 2, 4, 5) which is removably secured underneath the casing 1 just ahead of the stapler mechanism so as to maintain the fingers 22 at the proper level with respect to the fabric during the stapling operation; said spacer plate 59 may be removed if the carpet is thicker.

It will also be noted that cam arm 37 locks the lever 31 and consequently the advance plate 26 against relative movement with respect to the casing 1 during insertion of the staple, the advance plate 26 becoming disengaged only when cam arms 18 are retracted.

The guide blade 46 can be temporarily upwardly pivoted against spring 48 when making a turn with the stapling machine. With the machine of the invention a perfect joint is obtained even if the carpet is laid on an uneven surface during stapling.

The advancing mechanism including the fabric engaging plate 26 enables in one operation to advance the machine and clinch a staple. The machine automatically advances equal adjustable distances, so that the staples will be equally spaced from one another. Thus, a carpet joint can be very quickly effected with the machine of the invention.

As previously mentioned, after each stapling operation casing 1 is rocked downwardly towards the front using the front end of guide blade 46 as a rest point. During this rocking movement, blade 46 remains in the carpet joint due to the downward action of spring 48 to thereby prevent disengagement of the guide from the joint.

What I claim is:

1. A stapling machine having a casing, a handle pivoted on said casing, staple driving means and anvils actuated by said handle whereby said anvils pierce the material against which the machine is placed, and the staple driving means thereafter clinches a staple which is forced through the material against the anvils, a material engaging plate movably mounted under said casing and means operatively connecting said handle and plate to move said plate upon operation of said handle.

2. A stapling machine as claimed in claim 1, wherein said means include a member having one end engaging a portion of said plate and moved rearwardly of said casing by operation of said handle to thereby move said plate rearwardly relative to said casing prior to piercing of the material by said anvils, whereby to advance the machine before a stapling operation.

3. A stapling machine as claimed in claim 2, further including spring means acting on said plate and casing to return said plate forwardly relative to said casing when said handle is pivoted to an inoperative position.

4. A stapling machine as claimed in claim 1, wherein said plate is substantially coextensive with the base of said casing and supports said casing in spaced relation with the material to be stapled.

5. A stapling machine as claimed in claim 1, wherein said means include lever means pivoted on said casing and engage-

able with said plate, cam follower means carried by said lever means and a cam member engageable with said cam follower means and in turn engageable by said handle upon downward pivotal movement of said handle, said cam member causing rearward movement of said lever means and, consequently, of said plate relative to said casing upon operation of said handle, and further including spring means acting on said plate and casing to return said plate forwardly relative to said casing when said handle is pivoted to an inoperative position.

6. A staple machine as claimed in claim 5, further including an adjustable abutment to adjust the forward limit position of said plate relative to said casing.

7. A stapling machine as claimed in claim 5, further including a guide member carried by said casing forwardly thereof and aligned with the center line of said staple.

8. A stapling machine as claimed in claim 7, wherein said guide member includes a vertically adjustable bracket carried by said casing and a guide piece pivotally mounted on said bracket and spring means urging said guide piece downwardly.

9. A stapling machine as claimed in claim 1, wherein said plate carries means underneath the same to prevent relative movement between the same and the material to be stapled.

10. A stapling machine as claimed in claim 10, wherein said last-named means include prongs protruding from the underside of said plate.

11. In a stapling machine as claimed in claim 1, further including a spring blade extending longitudinally of said plate and secured thereto underneath the same and having a free front portion normally spaced from said plate and extending close to said anvils so as to press down on the material to be stapled.

12. In a stapling machine as claimed in claim 1, further including a staple magazine for said machine, slidably longitudinally mounted thereon, spring means urging said staple magazine towards the zone of said staple-driving means and stop means engageable with said magazine to block the same in retracted position against the action of said last-named spring means.

13. In a stapling machine as claimed in claim 1, wherein said staple-driving means include a stapling plunger movably guided in said casing, a stapling blade carried by said plunger and adapted to engage to staple, and a link pivotally connected to said handle and stapling plunger.

14. A stapling machine as claimed in claim 5, wherein said anvils are pivoted on said casing and further including a carriage movably guided in said casing, cam follower rollers carried by said carriage, links pivotally connecting said carriage and said anvils, and cam arms secured to said handle and engageable with said rollers to move said carriage to operate said anvils into staple-clinching position upon operative movement of said handle.

15. A stapling machine as claimed in claim 14, wherein said cam member is carried by said carriage.