

July 20, 1937.

H. J. HELLER

2,087,668

FASTENER DRIVING DEVICE

Filed Oct. 10, 1935

3 Sheets-Sheet 1

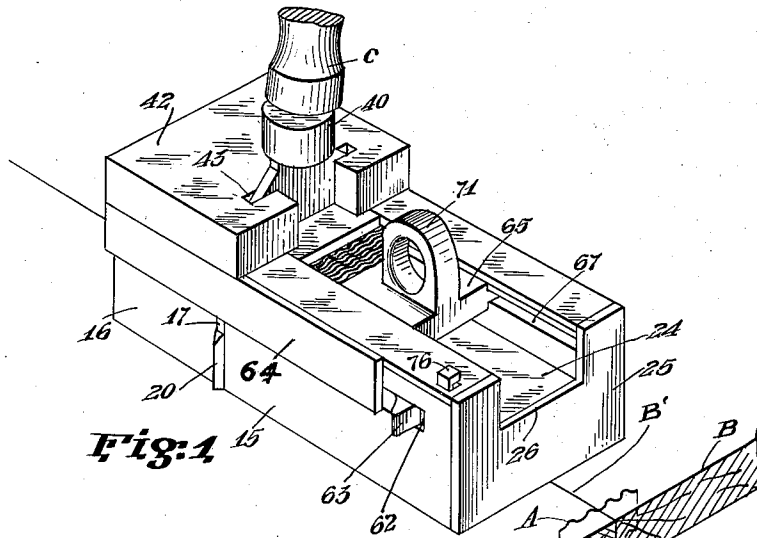


Fig:1

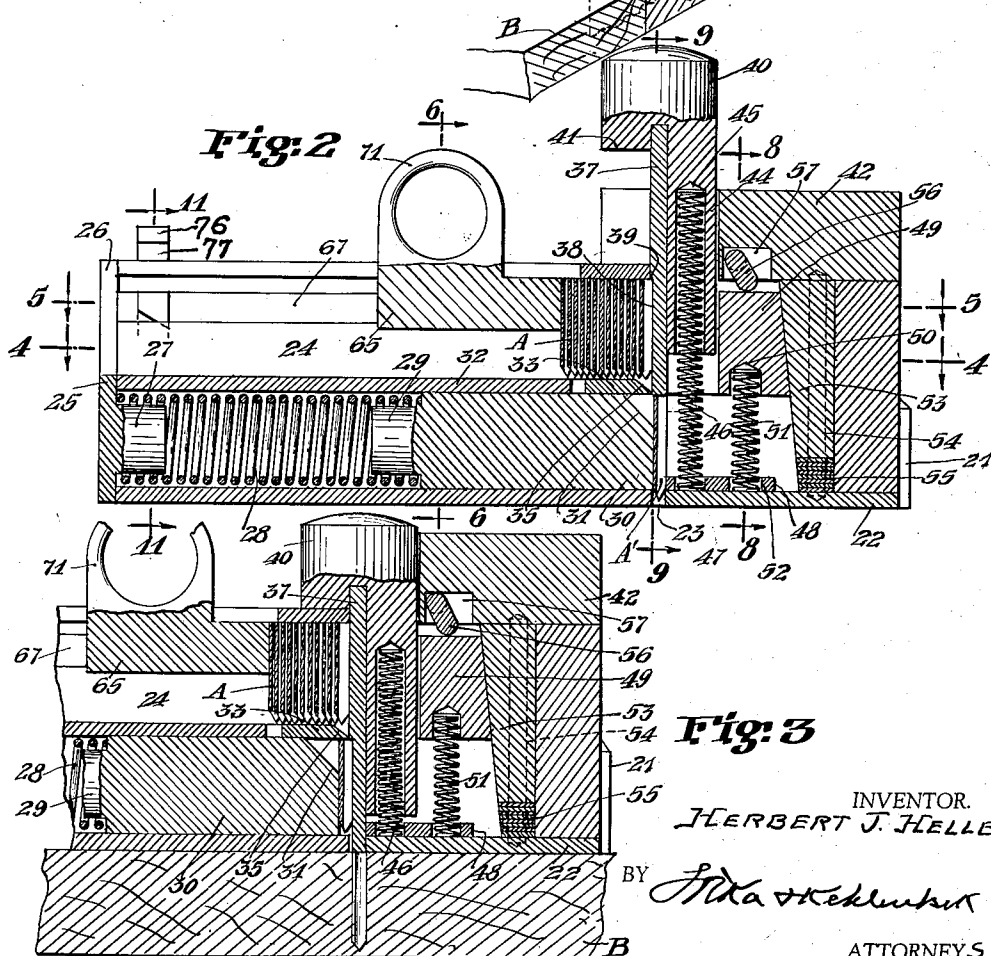


Fig:2

Fig:3

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3 Sheets-Sheet 2

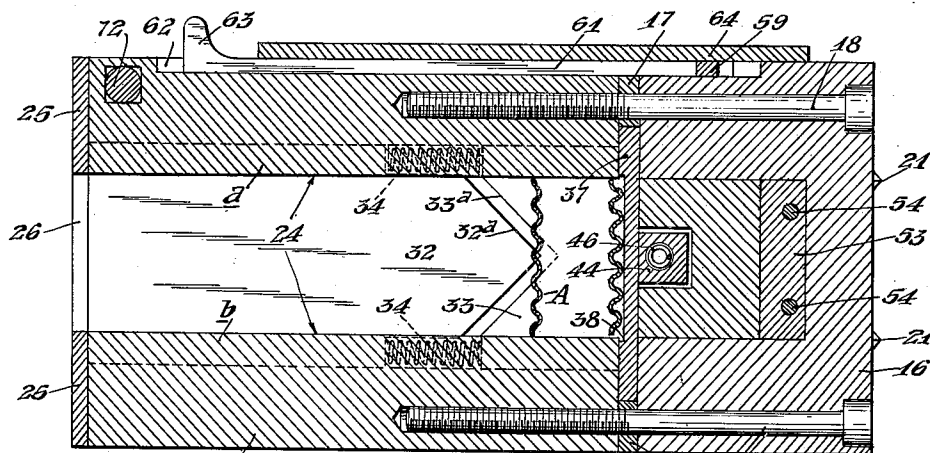


Fig. 4

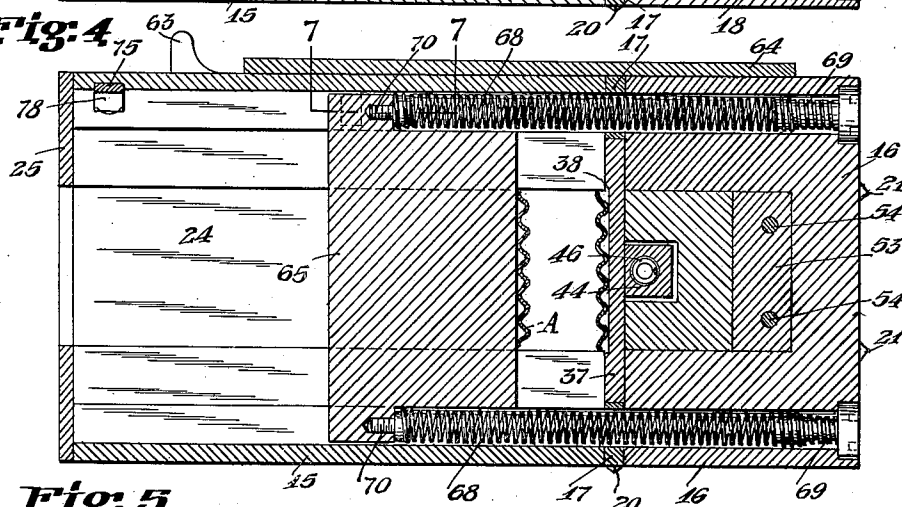


Fig. 5

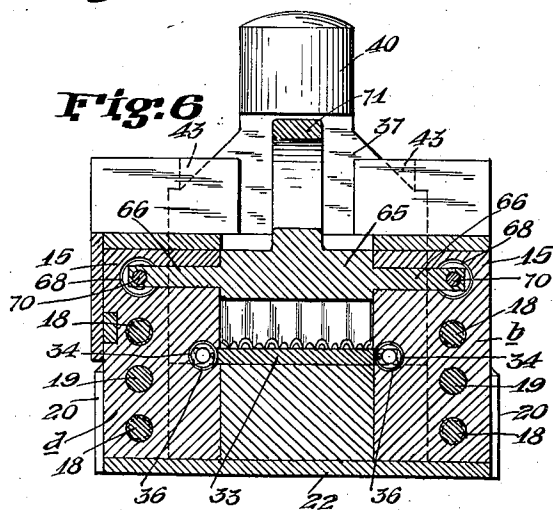


Fig. 6

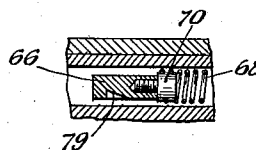


Fig. 7

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3 Sheets-Sheet 3

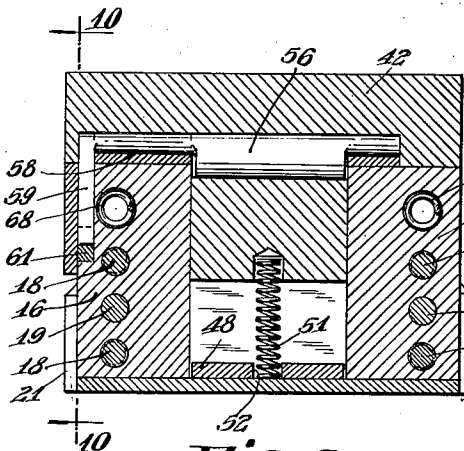


Fig. 8

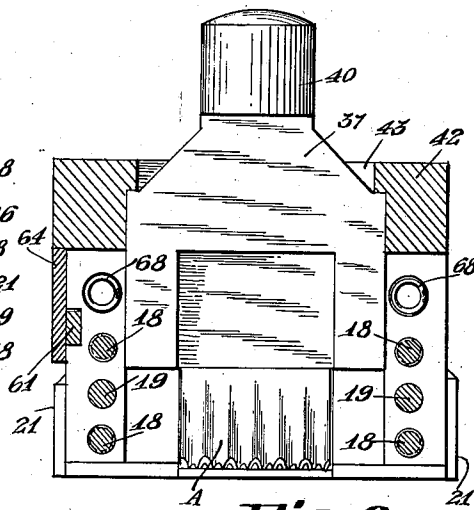


Fig. 9

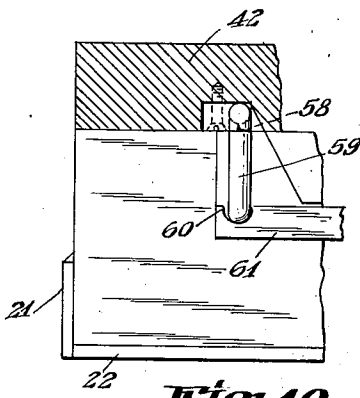


Fig. 10

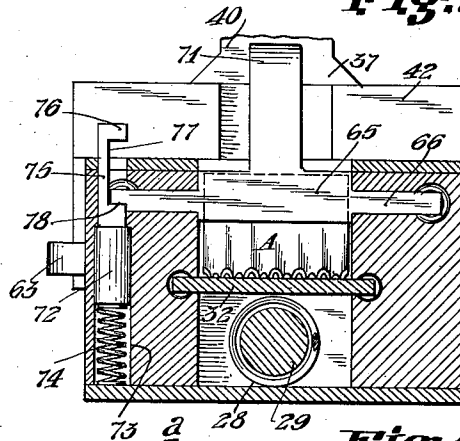


Fig. 11

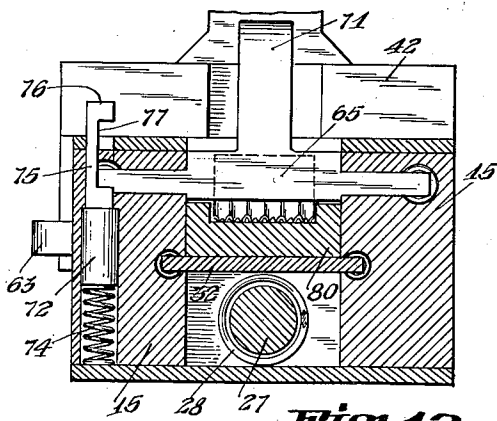


Fig. 12

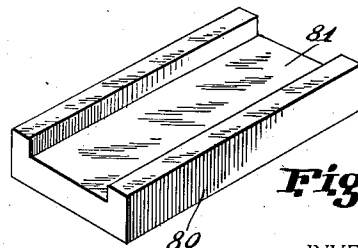


Fig. 13

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UNITED STATES PATENT OFFICE

2,087,668

FASTENER DRIVING DEVICE

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Application October 10, 1935, Serial No. 44,363

4 Claims. (Cl. 1-46)

In many industries and more particularly in the woodworking industry, it is the custom to utilize different types of fasteners which are driven into the wood for various purposes. For instance for the purpose of providing strong permanent joints in all kinds of wood products, such as boxes, furniture, signs, shelving, etc., fasteners generally made of corrugated metal in different dimensions, and customarily referred to as corrugated fasteners, are utilized; fasteners of the indicated type are also extensively used in wood trim building operations. Such fasteners generally speaking are incapable of being driven into the wood to their intended position with a single blow of a hammer or the like, and require more or less careful and skillful manipulation during the operation of driving the same into place in order to properly position the same and to avoid splitting of the wood and preferably so as to countersink the fasteners to permit subsequent planing if the same should become necessary.

The instant invention relates to devices for driving fasteners of the indicated type and equivalent fastener elements all of which require a succession of hammer blows or the like to drive said fasteners or fastener elements into the wood or its equivalent, and has for its object to provide a simple device whereby said fasteners may be automatically driven into place in a reliable and efficient manner without the necessity for exercising any particular skill in or supervision of the operation. Other more specific objects will appear from the description hereinafter and the features of novelty will be pointed out in the claims.

In the accompanying drawings, which show an example of the invention without defining its limits, Fig. 1 is a perspective view of the device in position for use; Fig. 2 is a longitudinal section thereof; Fig. 3 is a fragmentary longitudinal section similar to Fig. 2 illustrating the parts in a different position; Fig. 4 is a horizontal section on the line 4-4 of Fig. 2; Fig. 5 is a similar view on the line 5-5 of Fig. 2; Fig. 6 is a cross section on the line 6-6 of Fig. 2; Fig. 7 is a detail section on the line 7-7 of Fig. 5; Fig. 8 is a cross section on the line 8-8 of Fig. 2; Fig. 9 is a similar view on the line 9-9 of Fig. 2; Fig. 10 is a fragmentary section on the line 10-10 of Fig. 8; Fig. 11 is a cross section on the line 11-11 of Fig. 2; Fig. 12 is a view similar to Fig. 11 and including an adapter whereby the device is adapted for accommodating fasteners of the various sizes and dimensions, and Fig. 13 is a perspective view of one form of said adapter.

In the form illustrated in the drawings the device comprises a housing consisting of two sections 15 and 16 separated by spacing members 17 and secured together in the form of a unit in any suitable manner, as by means of screws 18 and dowels 19 (Figs. 8 and 9); the screws 18 and dowels 19 pass through openings provided in the spacing members 17 as shown in Fig. 4 and thereby serve to also fix the latter in position as shown in Fig. 4. In the preferred arrangement index means in the form of markers 20 are provided on the spacing members 17, similar markers 21 being provided upon the section 16 as the forward face of the device for the purpose to be more fully set forth hereinafter. The device, in the illustrated example, further includes a bottom plate 22 which is fastened to the sections 15 and 16 by suitable fastening means such as screws or the like and, in addition to its other functions to be referred to further on in the description, assists in securing the sections 15 and 16 together; as shown in Fig. 2 the bottom plate 22 is provided with an opening 23 for the accommodation of successive fasteners as will appear more fully hereinafter.

As shown in Figs. 4, 6, 8, 11 and 12 the housing section 15 consists of two parallel members *a* and *b* spaced apart to form a magazine or chamber 24 extending lengthwise of said section 15, the latter at its free end being provided with an end plate 25 fixed in place in any conventional manner and serving to maintain the members *a* and *b* in proper spaced parallel relation; the end plate 25 is recessed at 26 in registry with the chamber 24 as shown clearly in Fig. 1 and also in some of the other figures. The end plate 25 in addition is provided with a projection 27 extending into the chamber 24 for the accommodation of one end of a spring 28, the other end of which is connected with a similar projection 29 carried by a block 30 slidably mounted in the chamber 24 and formed with an inclined face 31 at its forward end as shown in Figs. 2 and 3.

As illustrated in the drawings the device also includes horizontally movable slides 32 and 33 located in end to end relation as shown in Fig. 4, suitable springs 34 being provided for developing a force tending to move the slide 33 in a direction away from the slide 32; to provide a continuity of surface and to prevent the formation of a straight open space between said slides 32 and 33, the one slide may be formed with a tapering end 32^a arranged to project into a correspondingly formed recess 33^a on the other

slide as shown in Fig. 4. In addition the slide 33 is provided at its forward end with an inclined face 35, for the purpose to be more fully set forth hereinafter. With the arrangement described and shown in the drawings the slide 32 bears against the end plate 25 and is substantially stationary while the slide 33 is resiliently movable relatively to the slide 32 under the influence of the springs 34; to maintain the slides 32 and 33 in their intended positions the members *a* and *b* of the housing section 15 are provided with guide grooves 35 in which said slides are mounted and which also accommodate the springs 34 as illustrated in Fig. 6. In some instances a single spring-controlled slide may replace the slides 32 and 33 if this should be desired. When embodied in the device the slides 32 and 33 or equivalent means are in surface engagement with the block 30 and thus in addition to their other functions, serve to guide said block 30 in its sliding movements in the chamber 24, the block 30, as indicated in Fig. 2 resting and being movable upon the bottom plate 22.

In the illustrated example the means whereby the fasteners are driven into place consists of a plunger 37 vertically movable between the opposed faces of the housing sections 15 and 16 and guided in its vertical movements by the spacing members 17 as shown in Figs. 4 and 5; the plunger 37 is generally in the form of a fiat plate and is provided in its one surface with a recess 38 which faces the chamber 24 and forms a horizontal shoulder 39, the recess 38 being arranged to receive successive fasteners and the shoulder 39 serving to adjust said fasteners into position to be driven into place. The plunger 37 is carried by and movable with an impact receiving member or striking head 40 which projects above the housing sections 15 and 16 and includes a shoulder 41 constituting a stop whereby the downward movement of said striking head 40 and consequently of the plunger 37 is arrested; a cover plate 42 is conveniently fastened in place on the housing section 15 and is suitably slotted as indicated at 43 in Fig. 1 to assist in guiding the striking head 40 and plunger 37 in their vertical movements. The striking head 40 is formed with a depending extension 44 having a recess 45 for the accommodation of a coil spring 46 which has its lower end seated in the recess 47 of a plate 48 fastened in any conventional manner to the bottom plate 22 shown in Figs. 2 and 3; the spring 46 tends to move the striking head 40 and plunger 37 upwards and to restore these elements to their normal positions.

In the operation of the device the plunger 37 and with it the striking head 40 is driven downwardly in successive steps by repeated blows of a hammer or similar instrument upon said striking head 40 to hereby drive the fastener into its intended position in the wood with which it is to be combined. In order to prevent the plunger 37 and striking head 40 from returning upwardly to their original positions after each hammer blow or the like, a suitable means is provided for maintaining the striking head 40 and the plunger 37 in the position to which it is driven by each impact of the hammer or its equivalent. In the illustrated example this means comprises a movable wedge 49 provided at its lower end with a recess 50 for the reception of one end of a spring 51 which exerts a lifting action upon the wedge 49 as will be clear from the illustration in Fig. 2; the lower end of the spring 51 is seated in a recess 52 of the previously mentioned plate 48.

The inclined face of the wedge 49 is in surface engagement with the opposed inclined face of a stationary wedge 53 which may be secured in proper position in any suitable manner as by means of pins 54; in order to provide for adjustment to compensate for wear, the wedge 53 preferably rests upon a plurality of shims 55 which likewise may be fixed in place by the aforesaid pins 54 or other equivalent means whereby the stationary wedge 53 is secured in position. With the arrangement set forth and during normal operative periods of the device the spring 51 will force the wedge 49 upwardly and the latter in co-operation with the stationary wedge 53 will be forced into surface engagement with the extension 44 of the striking head, it being understood that the frictional engagement between the wedge 49 and said extension 44 is sufficient to maintain the striking head 40 and plunger 37 in any position to which the striking head 40 may be driven as the result of a hammer blow or its equivalent. As wear occurs on the inclined surface of the wedges 49 and 53, the shims 55 may be transferred from beneath the wedge 53 to the top thereof to thereby adjust the position of said wedge 53 to whatever extent may be necessary to compensate for the aforesaid wear.

The device further includes means for intentionally relieving the striking head 40 from the restraining influence of the wedge 49 to permit the spring 46 to restore said striking head 40 and plunger 37 to the original elevated position. In the form shown in the drawings this means comprises a wedge releasing member 56 which is located in a recess 57 of the cover plate 42 and is pivotally mounted in said cover plate by means of a rod 58 which extends laterally of said cover plate 42 and carries a depending member 59 projecting into a notch 60 of a controlling member 61 as shown in Fig. 10. The member 61 is slidably mounted in a groove 62 formed in the housing sections 15 and 16 and at its one end is provided with a finger-piece or projection 63 (Fig. 1) accessible exteriorly of the device for operating the controlling member 61 at will. The controlling member 61 may be maintained in the groove 62 in any suitable manner as by means of a plate 64 secured in place upon the housing sections 15 and 16 in any convenient manner as by means of screws or equivalent fastening means. In Figs. 2 and 3 of the drawings the wedge releasing member 56 occupies a position in which the movable wedge 49 is depressed and maintained out of contact with the extension 44 of the striking head, so that the latter and the plunger 37 are free to rise under the influence of the spring 46.

In addition to the parts so far described, the device includes a magazine follower 65 which is dimensioned transversely to slidably fit the chamber 24 and is provided at its opposite sides with ribs 66 extending into grooves 67 formed in the members *a* and *b* of the housing section 15 whereby said magazine follower 65 is capable of sliding in directions lengthwise of the said chamber 24. At their outer end portions the grooves 67 are enlarged for the accommodation of springs 68 connected at one end with adjustable holding screws 69 rotatably mounted in the housing section 16, each spring 68 at its opposite end being suitably connected with the magazine follower 65 as by means of screws 70. With the arrangement described the springs 68 tend at all times to draw the magazine follower 65 in a direction toward the plunger 37 as is clearly shown in Fig. 5 of the

drawings. To facilitate the manipulation of the magazine follower 65 when loading the device with fasteners the magazine follower 65 may be provided with a handle or finger-piece 71 as illustrated in the drawings. In order to retain the magazine follower 65 in an inoperative position at one end of the device during loading thereof, a suitable locking or latch means is provided; in the form shown in the illustrated example this locking or latching means comprises a vertically movable plunger 72 (Figs. 11 and 12) mounted in a recess 73 provided for instance in the member *a* of the housing section 15 and influenced by a spring 74 whereby said plunger 72 is maintained in and returned to a raised position. The plunger 72 is extended upwardly in the form of a latch 75 which projects upwardly beyond the housing section 15 and terminates in an operating head or the like 76 as shown in Fig. 11. The latch 75 is recessed as indicated at 77 to form a locking shoulder 78 which engages the lower surface of one of the ribs 66 and is adapted to snap into a notch 79 formed on the lower surface of said rib 66 as shown in Fig. 7 to thereby lock the magazine follower 65 in said inoperative position during insertion of a supply of fasteners into the device.

As previously stated, the device is designed primarily for driving fasteners of the corrugated fastener type which in practice generally are driven into the wood in position to span the joints between two sections of wood to thereby strengthen said joints. These corrugated fasteners are arranged in stacks preferably held together for convenient handling, for instance, by means of soft metallic wires and are introduced into the chamber 24 of the device with the lower penetrating edges thereof resting upon the slides 32 and 33, it being understood that the transverse dimension of the chamber 24 is designed to accommodate a predetermined size of the aforesaid fasteners, which dimension may correspond to the largest size of fasteners which the device is intended to accommodate. During the introduction of the fasteners the magazine follower 65 is held in its inoperative position at a distance from the plunger 37 by means of the locking shoulder 78 and the co-operating notch 79. When a supply of fasteners has been properly placed in position in the chamber 24 between the plunger 37 and the magazine follower 65 the latter is released by depressing the head 76 to thereby remove the locking shoulder 78 from the notch 79. As soon as this occurs the springs 68 will draw the magazine follower 65 against the terminal fastener at one end of the stack and at the same time will force the terminal fastener at the other end of the stack into the recess 38 and immediately beneath the shoulder 39 of the plunger 37. It will be understood that the soft metallic wires whereby the fasteners are held together in the stack are progressively cut as successive fasteners are released from the stack by the action of the driving means.

In order to properly accommodate fasteners of varying dimensions, an adapter may be provided for combination with the device, an example of such adapter being illustrated in Figs. 12 and 13. As shown the adapter comprises a body 80 dimensioned to fit into the chamber 24 and adapted to rest upon the slides 32 and 33 as illustrated in Fig. 12. The adapter is further formed in its upper face with a recess 81 arranged to receive the fasteners in stacks as previously described. It will be obvious by providing adapters in which the recess 81 is of different transverse width and

of different depth that fasteners of various sizes and dimensions may be accommodated in the device.

To prepare the device for use, or in other words to load the same, the magazine follower 65 is withdrawn or retracted by means of the finger-piece 71 against the tension of the springs 68 until the locking shoulder 78 snaps into the notch 79 on the lower surface of the one rib 66. The magazine follower 65 is thus held in position at the left hand end of the device in Fig. 2 of the drawings, or at the right hand end of said device as it appears in Fig. 1. A supply of fasteners A is then introduced into the chamber 24 in the space between the retracted magazine follower 65 and the plunger 37, said fasteners resting with their pointed ends upon the slides 32 and 33 and being arranged in the chamber 24 in the form of a horizontal stack which, as previously stated, may be held together by means of soft metallic wires. When a supply of fasteners A has been inserted in place, the locking shoulder 78 is released from the notch 79 by downward pressure upon the head or the like 76, to correspondingly shift the plunger 72 downwardly against the tension of the spring 74. As soon as the locking shoulder 78 has been removed from the notch 79 the springs 68 will draw the magazine follower 65 against the one end of the stack of fasteners A to thereby force the other end of said stack against the plunger 37 so that at this stage a terminal fastener A of the stack will lie in the recess 38 of said plunger 37 and beneath the shoulder 39 thereof as shown for instance in Fig. 2. It will be understood that the wedge releasing member 56 at this stage occupies an inoperative position in the recess 57 and that the movable wedge 49 is located in frictional engagement with the depending extension 44 of the striking head 40. In order to bring the terminal fastener A of the stack into position to be driven into the wooden element with which it is to be combined, the striking head 40 is depressed for instance by means of a hammer blow or a succession of hammer blows to cause the shoulder 39 of the plunger 37 to force said terminal fastener downwardly in front of the block 30 which, under the influence of the spring 28 will finally force said terminal fastener into position beneath the plunger 37 as indicated at A' in Fig. 2; as the terminal fastener is thus shifted into position to be driven the pointed end thereof first engages the inclined face 35 of the slide 33 and forces the same toward the slide 32 against the tension of the spring 34 (Fig. 4), or in the case of a single spring-controlled slide shifts the same against the tension of its spring. In either case, this operation removes the slide 33 or its equivalent from beneath said terminal fastener and permits the latter to engage the inclined face 31 of the block 30 which is forced toward the left in Fig. 2 against the tension of the spring 28 and thus permits said terminal fastener to reach a position between said block 30 and the depressed plunger 37. When the shoulder 41 of the striking head 40 arrests the further downward movement of said striking head 40 by engagement with the top plate of the device, the wedge releasing member 56 is operated by means of the controlling member 61 through the medium of the finger-piece 63 thereof to depress the movable wedge 49 and thereby move it out of engagement with the extension 44 of the striking head 40. The latter and the plunger 37 are thereby released and are returned to their normal raised position.

by the action of the spring 46. As soon as this restoration of the striking head 40 and plunger 37 has been accomplished the block 39 under the influence of the spring 28 will force the terminal fastener A beneath said plunger 37 to the position indicated at A' as illustrated in Fig. 2. The wedge releasing member 56 is now adjusted back to its normal inoperative position to permit the movable wedge 49 to be again shifted into frictional engagement with the anvil extension 44 whereupon the device is ready for its intended operation.

Assuming for instance that a number of fasteners A are to be successively driven into two contiguous wooden elements B to span the joint B' between the same at spaced intervals, the device is placed in position as indicated in Fig. 1, it being understood that the markers 21 at one end of said device serve as guides to properly position said device with respect to its transverse relation to the joint B'. The striking head 40 is then subjected to repeated blows for instance by means of a hammer C, the impacts of said hammer being delivered upon the upper end of the striking head 40 as illustrated in Fig. 1. At each blow upon the striking head 40 the action of the wedge 49 upon the extension 44 serves to hold the striking head 40 and the plunger 37 in the position to which it is driven by the individual hammer blows. As the successive impacts are delivered upon the striking head 40 the fastener A' will gradually be driven into the wood until finally the shoulder 41 of the striking head engages the top plate of the device which indicates to the operator that the driving of the fastener into the wooden elements B has been completed, the arrangement being such that at this stage the top of said fastener will be somewhat below the upper surface of the elements B to permit the same to be subsequently planed if this should be necessary. As the one fastener is thus being driven into place the next successive terminal fastener A will be removed from the stack in the chamber 24 by the action of the shoulder 39 and first by acting upon the inclined face 35 will force the slide 33 out of the way and then by acting upon the inclined face 31 will similarly force the block 30 against the tension of the spring 28 so that when one fastener has been driven into its final position, a second or successive fastener will be positioned between the end of the block 30 and the depressed plunger 37 as illustrated in Fig. 3. At this stage the wedge releasing member 56 is actuated in the manner previously described to force the movable wedge 49 downwardly and out of contact with the anvil extension 44 to thereby permit the spring 46 to return the striking head 40 and with it the plunger 37 to their normal raised position. As soon as the lower end of the plunger 37 reaches the position illustrated in Fig. 2 the successive fastener A will be forced into place beneath the plunger 37 to the position indicated at A' in Fig. 2 by the action of the block 39 under the influence of the spring 28. The wedge releasing member 56 is now again adjusted to its inoperative position to permit the spring 51 to readjust the movable wedge 49 into frictional engagement with the anvil extension 44 whereupon the device is ready to drive the next succeeding fastener into place. To permit this to be done the device is moved lengthwise of the joint B' to bring the next succeeding fastener A to the desired distance from the previously driven fastener A'; this spacing may be facilitated by the markers 20 which may serve in co-

operation with previously driven fasteners which are visible, to indicate to the operator the exact location which will be occupied by the succeeding fastener with respect to the previously driven fastener A'. The striking head is then again subjected to a series of hammer blows or other impacts to repeat the operations previously described and to drive the second fastener A' into place in the wooden elements B, this operation being continued until the shoulder 41 of the anvil again engages the top plate of the device and arrests further downward movement of the striking head 40 and the plunger 37.

It will be obvious that any number of successive fasteners A may be efficiently driven into place by the device and that said fasteners are held in accurate perpendicular relation to the elements with which they are being combined so as to avoid the possibility of splitting the wood or of driving said fasteners into improper positions into said elements. The striking head 40 may either be operated by a manually manipulated hammer or the device may be incorporated in an apparatus for operation by a mechanically driven hammer, provision being made in either case to prevent inadvertent hammer blows from accidentally releasing the striking head and to thereby prevent a successive fastener from being shifted forwardly before a preceding fastener had been fully driven into position. The device may be made to accommodate fasteners of different widths and heights by merely inserting the proper adapter 80 into place in the chamber 24 as illustrated by way of example in Fig. 12. The device is extremely simple in construction and requires absolutely no skill in its use and serves to overcome objections and disadvantages which have previously interfered with the efficient use of fasteners of the type under discussion.

Various changes in the specific forms shown and described may be made within the scope of the claims without departing from the spirit of the invention.

I claim:

1. A fastener driving device comprising a housing including a magazine arranged to contain a stack of fasteners, a plunger provided with a shoulder adapted to remove terminal fasteners from said stack in succession, a spring controlled block for positioning successive fasteners to driving position beneath said plunger, a striking head associated with said plunger for receiving impacts whereby said plunger develops a driving force on the fastener when in driving position, a spring tending to restore said plunger to normal position, a stationary wedge, a movable wedge in operative relation to said stationary wedge, a spring whereby said movable wedge is shifted relatively to said stationary wedge and into frictional engagement with said plunger whereby the wedge and said plunger are held against restoration to normal position subsequent to each impact, a stop on said plunger arranged to arrest the driving action of said plunger when the fastener being driven has reached a predetermined position, means for actuating said movable wedge to release said plunger to permit the latter to return to normal position, and a spring controlled magazine follower whereby said stack of fasteners is shifted to present the terminal fasteners of said stack into operative relation to said shoulder on said plunger.

2. A fastener driving device comprising a housing including a magazine arranged to contain a stack of fasteners, a plunger provided with a

shoulder adapted to remove terminal fasteners from said stack in succession, a spring controlled block for positioning successive fasteners to driving position beneath said plunger, a striking head 5 associated with said plunger for receiving impacts whereby said plunger develops a driving force on the fastener when in driving position, a spring tending to restore said plunger to normal position, a stationary wedge, a movable wedge in 10 operative relation to said stationary wedge, a spring whereby said movable wedge is shifted relatively to said stationary wedge and into frictional engagement with said plunger whereby the wedge and said plunger are held against restoration to normal position subsequent to each impact, a stop on said plunger arranged to arrest the driving action of said plunger when the fastener being driven has reached a predetermined position, means for actuating said movable wedge 20 to release said plunger to permit the latter to return to normal position, and means whereby said stack of fasteners is shifted to present the terminal fasteners into operative relation to said shoulder of said plunger.

25 3. A fastener driving device comprising a housing including a magazine having a bottom for supporting a horizontal stack of fasteners, driv-

ing means for receiving successive impacts to progressively drive a fastener into place, means in said magazine for automatically maintaining successive terminal fasteners of said stack in operative relation to said driving means, means 5 combined with said driving means for removing successive terminal fasteners from said stack, means for positioning successive fasteners in position to be driven by said driving means, and an adapter removably fitted into said magazine to 10 constitute a false bottom therefor whereby said device is selectively adapted to accommodate fasteners of varying dimensions.

4. A fastener driving device comprising a housing including a magazine having a horizontal 15 bottom for supporting a horizontal stack of fasteners, driving means for removing successive terminal fasteners from said stack and driving them into place, means for automatically adjusting said stack in said magazine to position suc- 20 cessive terminal fasteners in operative relation to said driving means, and an adapter removably fitted into said magazine to constitute a false bottom therefor whereby said device is selectively adapted to accommodate fasteners of varying 25 dimensions.

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