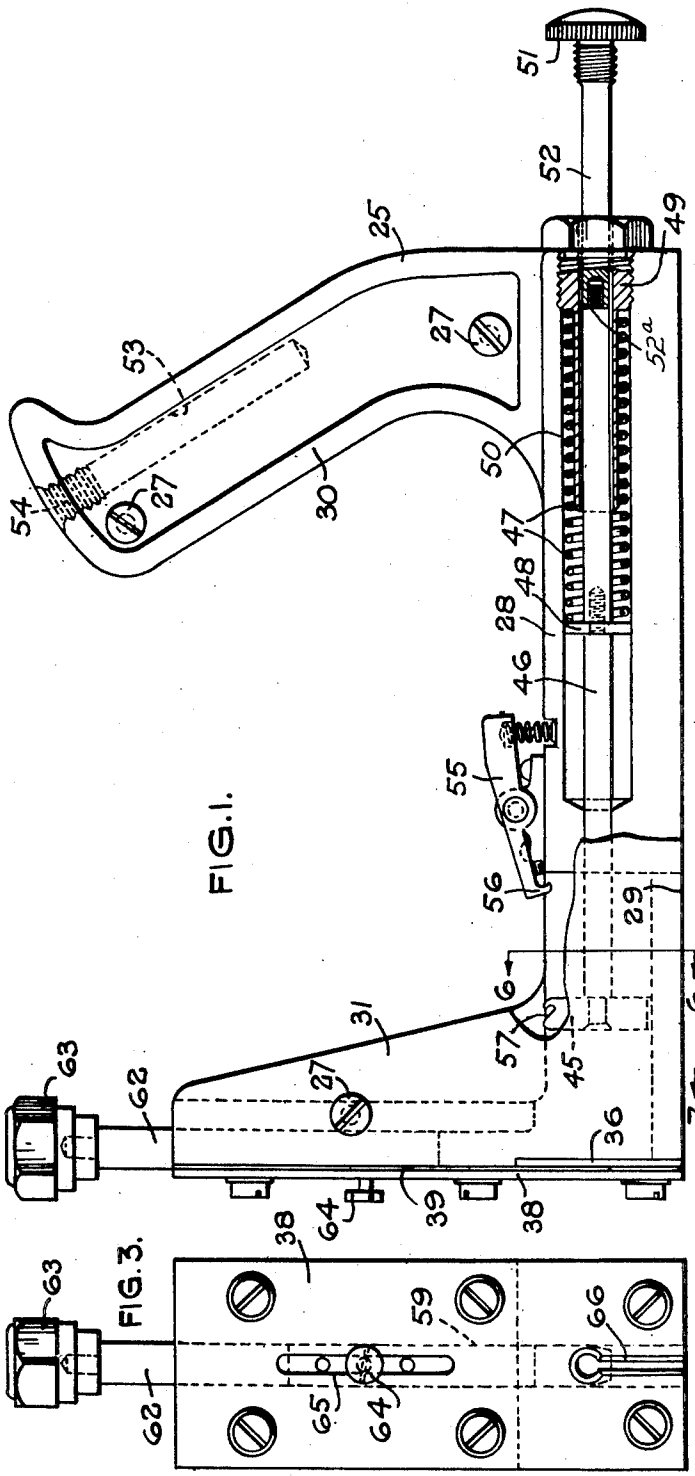
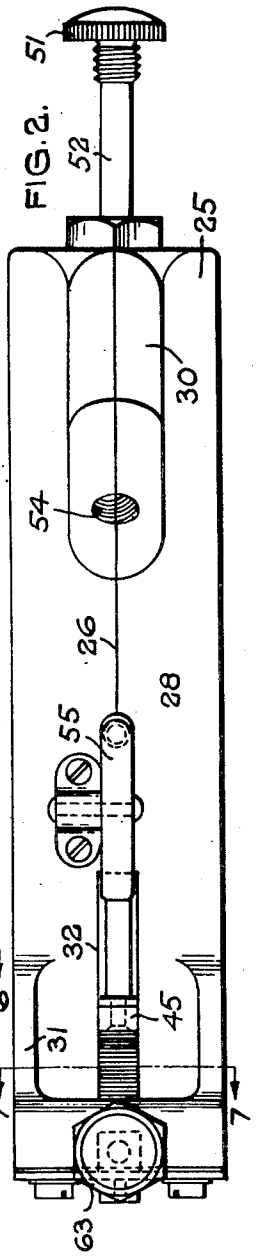
April 13, 1954 E. CHALMER 2,674,736

IMPROVED NAILING MACHINE

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FIG. 4.

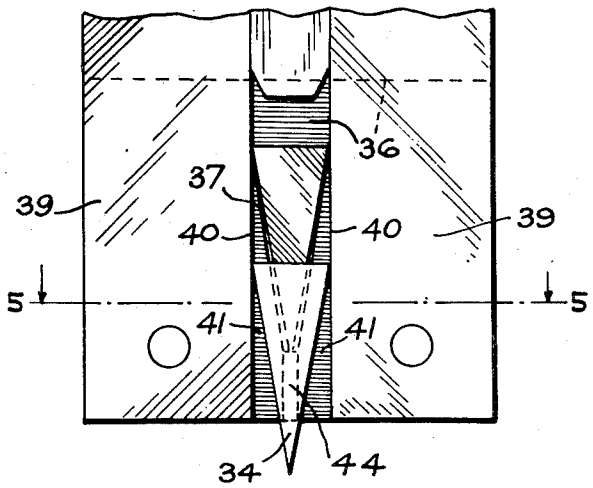
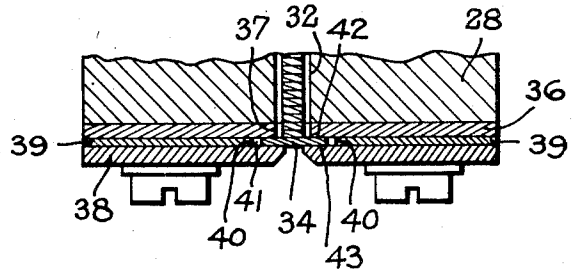



FIG. 5.

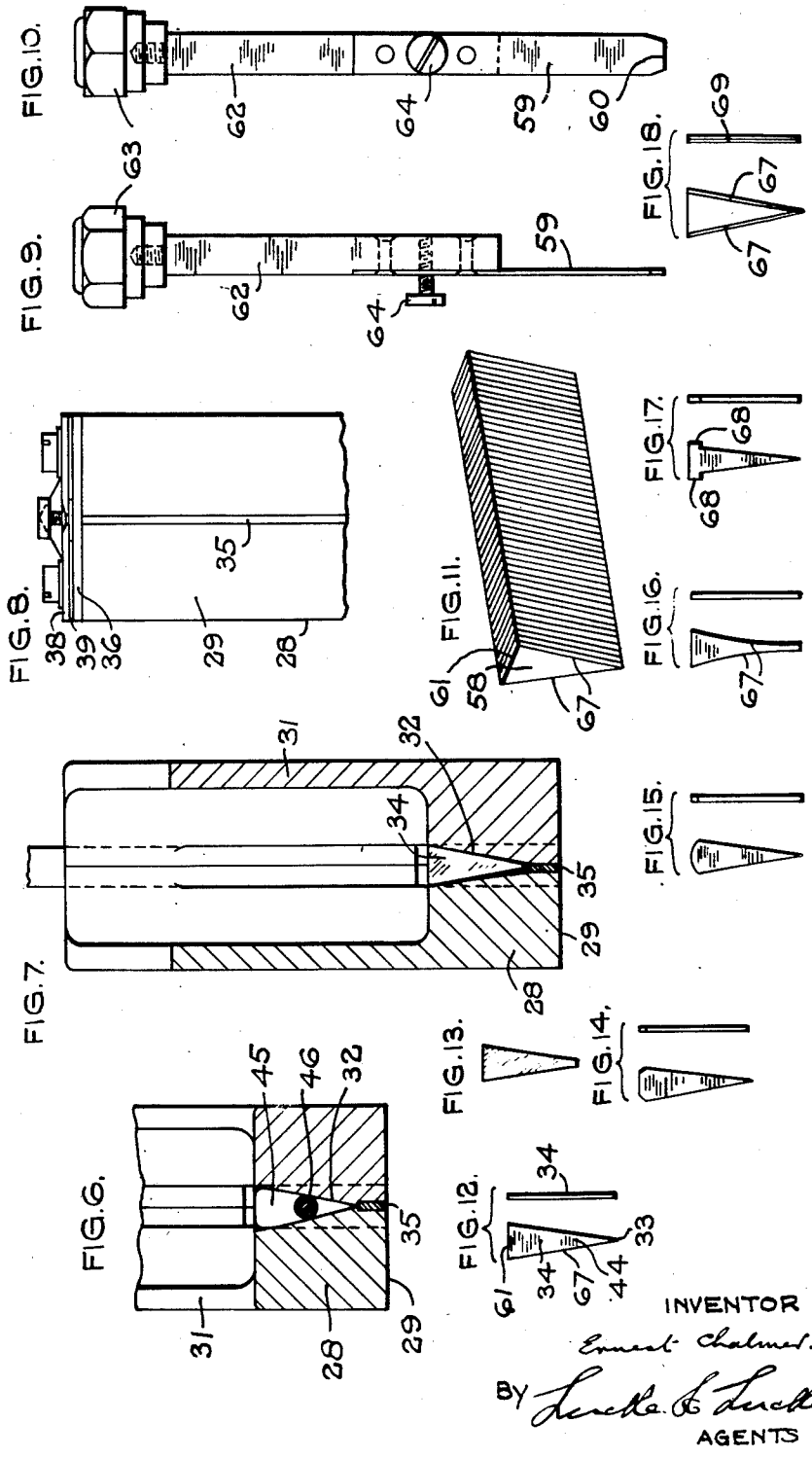



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IMPROVED NAILING MACHINE

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FIG. 19.

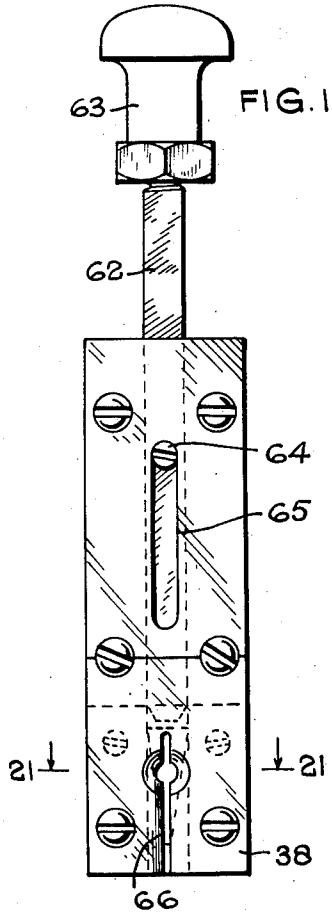



FIG. 20.

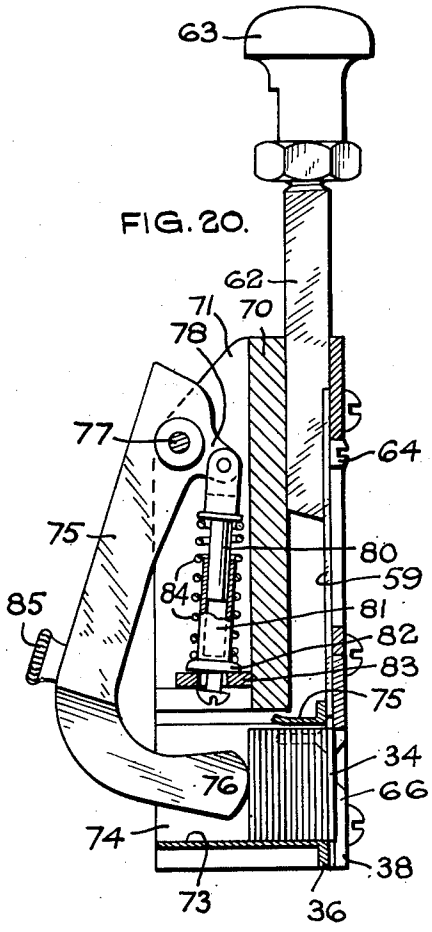



FIG. 21.

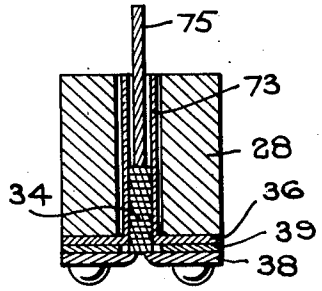
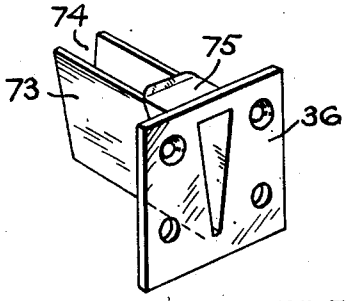



FIG. 22.




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FIG. 23.

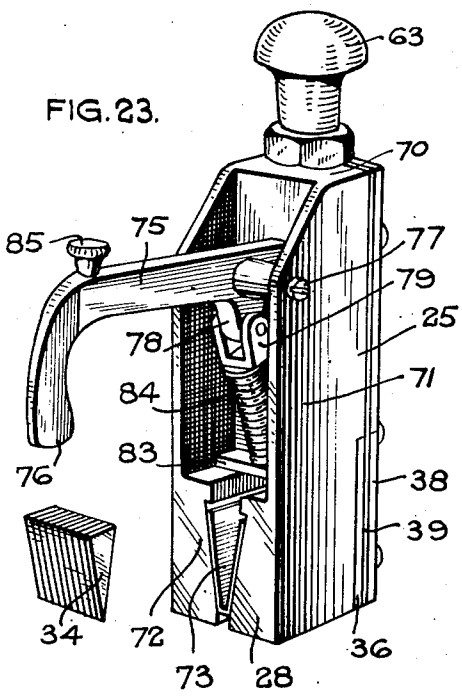



FIG. 24.

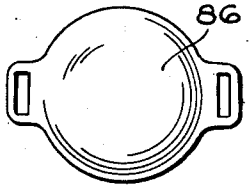
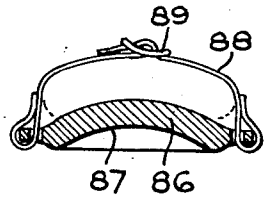



FIG. 25.




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# UNITED STATES PATENT OFFICE

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## IMPROVED NAILING MACHINE

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Application August 17, 1949, Serial No. 110,777

Claims priority, application Great Britain August 25, 1948

2 Claims. (Cl. 1—46)

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This invention relates to a nailing machine and has for its object the provision of an improved nailing machine of small and compact form for the driving of nails of flat form and of a minimum thickness, in which during driving the nails are supported in such manner that they are not liable to bend or buckle.

The invention is primarily applicable to the nailing in position of fibre board, ply-wood, panelling or sheeting formed of wood or other material adapted to be penetrated by metal nails. At present it is customary to use headed nails in securing such sheet material in position, for example, in interior building construction and decoration and the heads of the nails even after the sheet material has been painted or varnished are readily discernible so that the appearance of the surface of the sheet material is impaired.

The present invention enables such material to be nailed into position upon a supporting structure in such a manner that afterwards the nails are not readily discernible so that a painting or other coating operation for the purpose of hiding the nails is not necessary, and if such coating is provided the nails or the impressions made in the surface of the material by the nailing operation will be completely obscured.

My invention consists essentially in a machine for nailing in which during the driving of the nail it is positively guided on each of its opposite flat faces for movement only in a plane parallel to the plane of the flat nail so that the nail is positively prevented from bending or buckling while it is being driven.

Such a machine permits of the use of nails of the thinnest section consistent with proper penetration into the material to be nailed thus assisting in rendering the driven nail invisible or substantially invisible.

Furthermore, by guiding the nail in the above manner during driving, the nail may be made of such a small thickness that the edges thereof without any sharpening operation will penetrate into the material thus permitting of the nails being readily fabricated merely by blanking them out from a flat metal sheet or strip of the desired small thickness, with the result that the cost of the individual nails can be maintained at a particularly low figure.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a part sectional side elevation of one form of nailing machine embodying and for carrying out the present invention.

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Figure 2 and 3 are respectively a plan view and a front elevation of the machine depicted in Figure 1.

Figure 4 is a front elevation to an enlarged scale of the lower portion of the machine depicted in Figure 3, part of the machine being removed.

Figure 5 is a sectional view on the line 5—5 of Figure 4.

Figures 6 and 7 are sectional views on the lines 6—6 of Figure 1 and 7—7 of Figure 2, respectively.

Figure 8 is an inverted plan view of the front portion of the machine depicted in Figure 1.

Figures 9 and 10 are side and front elevations respectively of the nail driving mechanism of the machine depicted in Figure 1.

Figure 11 is a perspective view of a pack of assembled nails for use with the machine depicted in Figure 1.

Figure 12 shows in front and side elevation one of the nails of the pack depicted in Figure 11.

Figure 13 is a front elevation showing a slight modification of the nail depicted in Figure 12.

Figures 14 to 18 inclusive depict front elevations and corresponding side elevations of various alternative forms of nails for use in carrying out the present invention.

Figure 19 is a front elevation of an alternative form of nailing machine.

Figure 20 is a sectional side elevation of the machine depicted in Figure 19.

Figure 21 is a sectional view on the line 21—21 of Figure 19.

Figure 22 is a perspective view of part of the machine depicted in Figure 19.

Figure 23 is a perspective view of the machine depicted in Figure 19.

Figure 24 is a plan view of a hand hammer to be worn by the operator for use in operating the machine depicted in either Figure 1 or Figure 19.

Figure 25 is a cross sectional view of the hammer depicted in Figure 24.

Referring firstly to Figures 1 to 10 of the drawings the nail driving machine there illustrated comprises a body 25 formed as a two-part metal casting, the two parts being connected together along the longitudinal plane of the machine as indicated at 26 and being secured together by screws 27.

Such assembled body comprises a base 28 the under side 29 of which is adapted to rest on the surface of the board or other sheet material to be nailed and comprises further a handle 30

whereby the machine can readily be gripped by the operator and transported and disposed at the rear end of the machine, the front end of the body being provided with an upstanding bracket 31 in which the nail driver to be hereinafter described is slidably mounted.

The base 28 is formed at its upper side with a cavity of V-shape in cross section which forms a magazine 32, the cross section of the magazine corresponding to that of the pack of nails each of triangular form as depicted in Figures 11 and 12.

The points or apices 33 of each nail denoted by 34 are adapted to be driven into the material to be nailed and for this purpose are sharp, and to prevent wear of the base of the triangular shaped magazine by these points, the base of the magazine is constituted by a narrow strip 35 of metal harder than that forming the body casting.

As will be observed the magazine extends parallel to the under side 29 of the base which under side is plane.

The base 28 at its front end and adjacent the front end of the magazine 32 is provided with an anvil plate 36 of metal harder than that forming the base, the anvil plate being of rectangular configuration extending for the full width of the base and flush with the under side thereof and being formed with a triangular opening 37 as shown in Figure 4 in alignment with and shaped corresponding to that of the magazine 32, which plate extends at right angles to the under side of the base 28.

Secured to the front face of the bracket 31 and to the front end of the base 28 is a front abutment plate 38 which is spaced from the anvil plate 36 by means of a pair of spacer strips 39 of thickness slightly greater than the thickness of the nails to be driven, the opposed vertical edges 40 of these spacer strips being spaced apart from one another by a distance slightly greater than the maximum width of the triangular shaped nails so that at the front end of the base there is provided a driving guideway 41 as shown most clearly in Figures 4 and 5 of dimension slightly greater than the thickness and maximum width of the particular nails to be driven.

The front surface 42 of the anvil plate and the rear surface 43 of the front abutment plate each constitute nail guiding faces for supporting and positively guiding the nail on each of its opposite flat faces 44 for movement only in a plane parallel to the plane of the flat nail, so that during driving, the nail is positively prevented from bending or buckling in a manner which will be explained more fully hereafter.

The base 28 is provided with nail pack advancing means consisting of a pusher 45 of cross section corresponding to that of the magazine 32 and slidable therein as shown in Figures 2 and 6, the pusher being mounted on the forward end of a longitudinally extending pusher rod 46 slidably mounted within the base and advanced in a forward direction by spring 47 acting between collar 48 mounted on the rod 46 and a stationary abutment 49 which is screwed into the rear end of a housing 50 formed in the spring within the base 28.

Retraction of the pusher 45 for the purpose of re-loading the magazine 32 is effected by knob 51 provided on an extension 52 of the pusher rod 46, and this extension is detachable at 52a from the pusher rod itself and is adapted when the machine is out of use to be housed within a bore 53 provided with the handle 30, the outer end of the bore being screw threaded at 54 for engagement with a correspondingly screwed part of the extension 52 to secure this in position.



The pusher is held retracted during loading of the magazine by providing the upper side of the base with a spring loaded catch 55 having a lug 56 adapted to engage in a recess 57 on the upper side of the pusher, loading of the magazine with the pusher retracted being effected through the open upper side of the magazine.

When the pusher is released it serves under its spring loading to advance the nail pack along the magazine so as to bring the front face of the foremost nail on the pack as indicated at 58 in Figure 11, into engagement with the nail guiding face 43 of the front abutment plate 38 so that the foremost nail is within the nail driving guideway 41.

Driving of the nail is effected by means of a nail driving member 59 shown most clearly in Figures 9 and 10 of thickness slightly less than the thickness of each nail to be driven, the nail driving member being mounted for sliding movement within the driving guideway and having its lower end formed with a nail driving edge 60 of width somewhat less than the maximum width of the nail to be driven, which edge 60 is adapted to strike the upper edge or head 61 of the triangular shaped nail.

The upper end of the nail driving member 59 is mounted upon the lower end of a plunger 62 of square form in cross section slidably mounted within a correspondingly shaped guideway formed in the front face of the bracket 31, the upper end of the plunger projecting above the bracket and carrying an operating knob 63, movement of the plunger in each direction being limited by providing it with a set screw 64 which extends through a vertical slot 65 formed in the plate 38 and so arranged that with the plunger in its uppermost position the driving edge 60 of the member 59 is withdrawn a short distance above the upper side of the magazine as indicated in Figure 4 to permit of the advancement of the foremost nail on the pack into the driving guideway.

The disposition of the slot 65 in relation to the screw 64 and member 59 further ensures that when the plunger is fully depressed the driving edge 60 projects a very small distance below the under side 29 of the base so that the head of the nail is driven a short distance below the surface of the material to be nailed.

The front abutment plate 38 is provided at its lower end with a further slot 66 for the purpose of facilitating the inspection of the interior of the machine adjacent the driving guideway.

The preferred form of nail for use with the machine above described is shown in Figure 12 and is formed merely by a blanking operation from sheet metal or strip of thickness corresponding to the desired thickness of the nails.

After blanking out the nails as depicted in Figures 12 or 13 they are assembled together in pack form as shown in Figure 11 with each of the edges of each nail in aligned relationship with the corresponding edge of each of the other nails in the pack, the nails being secured in this position so as to be readily severable from one another in the known manner by use of a suitable adhesive.

With a machine and nails as above described nailing is effected by first loading the machine and placing the same with the under side 29 of the base upon the surface of the material to be

nailed, the operator grasping the handle 30 with one hand and striking the operating knob 63 with the other hand so as to cause the foremost nail in the pack to be detached and driven down the driving guideway into the material, the entire nailing operation being effected at a single downward movement or stroke of the nail driving member 59.

Immediately the nail to be driven has been detached from the pack and advanced down the driving guideway the nail will be positively guided against movement in a rearward direction by the engagement between its rear face and the nail guiding face 42 of the anvil plate 36 and which is immediately adjacent the opening 37 therein. This will be apparent from a consideration of Figures 4 and 5 in which the partially driven nail is depicted at 34 and throughout the driving operation that part of the nail which has yet to enter the material is positively guided throughout the entire length of such part by its engagement with the nail guiding face 42 of the anvil plate 36.

Similar guiding is effected by the engagement of the face 43 of the abutment plate 38 with the front face of the nail so that during driving the nail is positively prevented from bending or buckling and improper nailing of the material is avoided as well as damage thereto or the unsightly appearance in the finished material consequent on the bending or buckling of the nail.

On the completion of the driving operation the driving edge 60 is projected slightly below the surface of the material so as to ensure that the head of the nail after driving is correspondingly below such surface, thus ensuring that the head of the driven nail is not readily visible.

After the driving has been completed the driving plunger is retracted for the full length of its stroke and the machine is ready for driving a further nail.

In order to reduce the area of the head which will be adjacent the surface of the material after driving the head may be of chamfered form as indicated in Figure 14, or of convex form as indicated in Figure 18.

Reduction in resistance to the driving of the nail may be effected by making the lateral edges 67 of the nail of concave form as indicated in Figure 16.

Where it is desired to increase the grip between the nail and the material the head of the nail may be formed with laterally extending shoulders as indicated at 68 in Figure 17.

If desired the lateral edges 67 of the nail may be sharpened to form a cutting edge as indicated at 69 in Figure 18 but the provision of such cutting edge would not normally be considered necessary and would only be provided for use with certain materials having an unusually high resistance to the insertion of the nails.

In the case of the modified forms of nails indicated in Figures 13 to 16 inclusive and Figure 18, the magazine would have the same configuration as that used for the nails depicted in Figures 11 and 12 although if desired in the case of the nails depicted in Figure 16 the sides of the magazine might be convex to correspond to the concavity of the nail edge 67.

In the case of the nail depicted in Figure 17 the magazine would preferably be of cross section corresponding to the front elevation of the nail depicted in this figure.

All of the nails herein described are characterised by having a relatively high resilience and flexibility, such resilience and flexibility arising from the selection of a thickness not exceeding .036", while further by having a thickness not less than .018" the nails possess a substantial resistance to buckling during driving.

Referring now to Figures 19 to 23 of the accompanying drawings there is here depicted a machine of a smaller and more compact form than that above described in which the length of the machine is very substantially reduced, although the principle and mode of operation is the same.

In this modified construction the body 25 of the machine is formed as a one piece casting of generally channel form in cross section of which the base portion 70 of the channel corresponds to the bracket 31 of the preceding construction and provides in similar manner a guide for the driving plunger 62.

The base 28 of this machine is formed by one end of the sides 71 of the channel shaped body, which sides are here formed with integral oppositely directed lugs 72 so as locally to be of increased thickness, which lugs form part of the base 28 and the magazine 32 is formed as a sheet metal member 73 of V form separate from the body 25 and is housed between the opposed faces of the lugs 72, the front end of the magazine being secured to the anvil plate 36 provided at the front end of the base as in the preceding construction, such anvil plate thereby serving to secure the magazine in position.

In this machine loading of the magazine is effected through the rear open end 74 thereof and to assist in guiding the loaded pack of nails into position the upper side of the magazine is closed at 75 near its forward end.

Advancement of the pack of nails along the magazine is effected by a pusher 75 in the form of an L-shaped arm, the end 76 of the shorter limb of which is made of convex form for engaging with the rear end of the pack to permit of the pusher having limited angular movement relative to the pack and the free end of the longer limb is mounted upon a pivot 77 extending between the sides 71 of the channel shaped body, the pusher being here provided with a lug 78 connected pivotally between the forked end 79 of a male member 80 which slides within a female member 81, the opposite lower end 82 of which is mounted for limited rocking movement upon a plate 83 extending rigidly between the sides 71 adjacent the aforesaid lugs 72.

A compression spring 84 is provided acting between abutments on the male and female members, the arrangement being such that the spring normally displaces the pusher 75 in an anticlockwise direction in Figure 20 to advance the pack, but by means of knob 85 the pusher can be retracted against the spring causing the pivot between the lug 78 and the male member 80 to pass over a dead centre position whereby the spring retains the pusher in the retracted position depicted in Figure 23 to enable loading of the magazine readily to be effected.

Both of the machines above described are adapted for operation by striking the operating knob 63 with the user's hand without the employment of an ordinary hammer or other striking tool, but for the purpose of avoiding bruising of the operator's hand I prefer to provide a hammer of the form shown in Figures 24 and 25 to be worn on one hand of the operator, such hammer

consisting essentially of a striking head 86 having a concave striking face 87 for engaging with the operating knob 63, such striking head being adapted to be secured beneath the palm of the hand by providing it with a securing strip 88 having a buckle or other fastening 89 adapted to be passed round the back of the hand for retaining the striking head in position.

It should be noted that the positional references above made to the machines described are employed in an illustrative and not a limiting sense, that is to say, for example, with the machines illustrated in Figure 1 the nailing may be effected with the machine in the horizontal position shown or it may be effected equally well with the under side 29 of the base in a vertical position as in nailing vertical sheeting, while it may be employed equally well with the machine inverted, for example, in securing ceiling boards in position, the pressure exerted by the pusher 45 on the nail pack serving to retain the same within the magazine when the machine is inverted.

The same observations apply to the machine depicted in Figures 19 to 23.

What I claim then is:

1. In a machine for driving nails of flat, substantially triangular form so as to be of maximum width at the head of the nail, said machine comprising a base, the underside of which is adapted to engage with the surface of the work, a nail magazine in said base, a nail feeding device, and a reciprocable nail driving blade, a nail feeding guideway in said magazine of substantially triangular configuration spaced above the underside of the base but converging to an apex downwardly towards said underside, a nail driving guideway of elongated flat form in cross section having a width and thickness corresponding respectively to the head width and thickness of the nail to be driven, said nail driving guideway being adapted to receive said reciprocable blade and being constituted by a pair of parallel nail edge engaging members spaced from one another by a distance corresponding to the nail width at its head, said nail driving guideway being also constituted by a pair of nail face engaging members spaced apart by a distance corresponding to the thickness of a single nail to be driven, said nail face engaging members presenting straight parallel faces to opposite faces of the nail which is being driven,



one of said nail face engaging members having an opening therein of configuration corresponding to that of said feeding guideway and forming an aligned continuation of said guideway, said nail face engaging member which has the opening therein being integral with said nail magazine, and each of said nail edge and nail face engaging members extending for the full depth of said opening in a direction towards the underside of said base and terminating flush with said underside so as continuously to guide opposite longitudinal edges and opposite faces respectively of each nail throughout its entire driving movement right up to the position at which it enters the work.

2. A machine according to claim 1 wherein the machine comprises a body of channel form in cross-section the base of the machine being formed at one end of said channel shaped body, said nail driving blade being mounted for sliding movement in a direction parallel to the length of said channel shaped body, said nail feeding device comprising an arm of L-shape, the longer limb of which is pivotally mounted at its free end between the sides of the channel shaped body, the extremity of the shorter limb of the arm being adapted to engage with a nail pack within the magazine, an extensible spring link being pivotally connected to the body and to the arm adjacent the end of the longer limb thereof, said spring link being adapted to pivot the arm in a nail pack advancing direction and said pivot between the spring link and the arm being adapted on pivotal movement of the arm in the opposite direction to pass over a dead centre position relative to the arm pivot so as to retain the arm in a retracted position for effecting re-loading of the magazine.

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